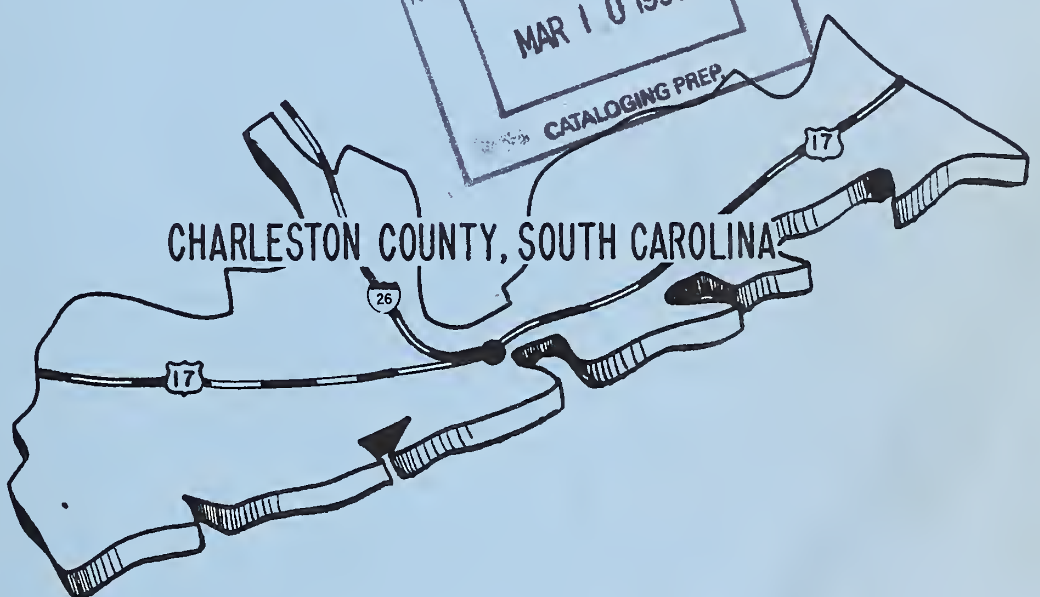
CHARLESTON COUNTY

SOUTH CAROLINA

FEASIBILITY STUDY OF REQUIREMENTS FOR MAIN DRAINAGE CANALS

CHARLESTON COUNTY, SOUTH CAROLINA



Prepared under sponsorship of
CHARLESTON COUNTY COUNCIL
and
CHARLESTON SOIL CONSERVATION DISTRICT
in cooperation with the
U. S. Department of Agriculture
Soil Conservation Service

Foreword

The interrelationships of water and land have been an important factor in the development and growth of the Charleston community since the first Europeans settled here. The absence of a well-defined drainage pattern and the other unusual geographic and topographic features of this area have intensified the problems.

Most of the water control measures installed to date in the urban and rurban areas have been the result of expediency incident to population growth and not according to a well developed plan of action. The lack of such a plan has resulted in unwise expenditures and has emphasized the need for, and the importance of, a comprehensive study of the problem.

The Feasibility Study of Requirements for Main Drainage Canals in Charleston County is the outgrowth of interest originally evidenced by the supervisors of the Charleston Soil Conservation District. The plan as developed is the result of cooperative effort on the part of Charleston County Council and the Charleston Soil Conservation District. It is the first step toward solving the drainage needs of the County, which is recognized as a problem of first priority. Agencies on all levels of government - local, county, state and federal - and numerous organizations and individuals, cooperated in the development of the plan. The Charleston Soil Conservation District and the Charleston County Council contributed largely to the cost of the project. Technical assistance was furnished by the Soil Conservation Service.

The plan will provide a firm basis for action by the Charleston County Council in determining needed legislation, methods of financing the necessary drainage improvements and priorities of work. The cooperation of other agencies, groups and individuals, in the use of the plan also will be encouraged.

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FEASIBILITY STUDY OF REQUIREMENTS FOR MAIN DRAINAGE CANALS CHARLESTON COUNTY, SOUTH CAROLINA

Introduction and Scope

The use of most of the land in Charleston County is dependent on providing adequate drainage. The lack of drainage is the principal detriment to the development of the land resources of the county. It results in frequent and costly crop damage on agricultural land and to property damage and disruption of facilities, both public and private, in urban and industrial areas.

The need to reduce flooding through drainage improvement is recognized as a problem of first priority.

The Feasibility Study of Requirements for Main Drainage Canals in Charleston County is the logical first step toward solving the excess water problem. The purpose of the study is to point out the extent and severity of the drainage problem in the county and to furnish a guide to determine the physical feasibility and the estimated cost of the needed improvements. To accomplish this purpose, a Main Canal Drainage System has been developed for the major watersheds of the county and a discussion of some of the principal criteria used in design given.

The data in this report is based on reconnaissance surveys, information presently available, and on knowledge gained by long experience in planning and establishing drainage facilities in the county. The data is adequate for the purpose of determining preliminary design and cost estimates but is not adequate for the preparation of final construction plans, designs, and costs. The data herein presented, however, can be used by qualified engineers as guides in securing detailed information for these purposes. Included also are technical references which can supply information for the final engineering investigations, plans, and designs.

AGREEMENT SIGNED--Dr. T. S. Buie, SCS State Conservationist, signs an agreement to plan a county-wide drainage feasibility study in Charleston County. J. Mitchell Graham (left), chairman of the Charleston County Council, and T. Wilbur Thornhill (right) chairman, Charleston Soil Conservation District also signed the agreement.

Factors Affecting Drainage

The location of Charleston County along the Atlantic Seaboard and its physical features, result in complex drainage problems. The physical features that contribute to these problems are topography, high tidal ranges, rainfall, soils, and land use changes. All these are inter-related. A brief discussion of how the physical features affect drainage follows.

Topography

Topography is a severely limiting factor affecting drainage. The land is generally level with slight undulations. Sharp breaks in topography occur along tidal streams and marshes. Elevations in the county range from sea level to 70 feet above sea level with most of the drainage problems occurring between the 5 to 10-foot contour (M. S. L. Datum). The coast line is irregular and indented by tidal creeks which are the natural outlets for drainage. The natural interior drains are extensions of the tidal creeks with slightly increasing elevations as they penetrate inland. The natural drains are broad, have flat grades, and are heavily vegetated. In their natural state, little or no channel exists, causing extensive ponding in depressed areas.

Tidal Ranges

The wide tidal fluctuations provide the only means by which gravity drainage, at ebb tide, can be accomplished. These fluctuations also result in the intrusion of high tides inland resulting in restricted drainage or flooding.

The tidal effects along the coast line of the county are very complex and highly variable dependant on the force, direction and duration of winds and other weather events occurring seaward. Predicted or normal range of tides above mean low water, with no consideration of wind effects, is 5.2 feet, with spring tides ranging to 6.8 feet. However, daily tide records maintained by the U. S. Weather Bureau, Charleston, S. C., show that there is a considerable variation between the predicted and actual tide ranges due to wind. Generally, tide heights have a departure of 2.0 feet above the normal and low tides have a departure of 1.0 - 1.5 feet below normal. Storm tides which occur when sustained winds along the coast exceed 40 miles per hour have a departure from normal of 2.5 to 3.0 feet. A thorough knowledge of tidal action is essential in proper planning and design of drainage systems and supporting structures.

Rainfall

U. S. Weather Bureau Records, Table No. 1, shows monthly and yearly rainfall records for

Table No. I
Rainfall Data - U. S. Weather Bureau
Charleston, S. C.

CHARLESTON, SOUTH CAROLINA
CUSTOM HOUSE
1958

TOTAL PRECIPITATION

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	Annual
1906	3.65	2.08	2.32	1.17	2.81	4.75	8.68	7.67	3.31	4.87	.38	1.83	43.62
1807	.86	1.61	1.01	3.72	2.98	4.58	2.33	5.04	2.73	1.53	1.22	4.06	31.71
1908	2.49	3.15	2.16	4.92	2.01	2.70	2.80	4.88	1.06	1.55	2.75	.84	31.41
1909	.61	1.86	5.89	3.58	1.54	1.84	4.17	7.65	5.35	2.00	2.44	1.75	38.86
1910	1.39	3.64	.63	1.00	1.01	3.85	4.68	10.00	4.39	6.18	1.61	1.21	38.89
1911	.56	1.11	1.27	1.74	.13	2.64	2.23	7.52	5.24	3.92	1.49	3.63	31.88
1912	3.85	5.17	4.14	4.92	3.93	8.88	3.05	2.77	10.42	.96	1.30	3.80	51.32
1913	.99	5.53	3.60	1.40	.18	2.86	5.51	3.50	7.26	6.65	1.19	2.59	41.48
1914	2.10	6.87	2.34	2.77	.82	4.33	7.14	4.13	4.89	4.14	2.34	2.35	44.32
1915	7.44	2.53	2.63	1.13	8.82	4.52	2.98	5.40	2.07	4.27	1.65	2.81	46.55
1916	1.34	1.47	1.86	2.35	1.22	9.75	11.61	3.10	2.78	4.37	1.11	1.47	42.51
1917	2.69	2.07	3.05	.97	3.80	1.92	9.85	5.06	2.34	.33	.31	1.08	33.57
1918	1.13	1.31	1.65	2.49	3.65	.27	7.69	2.87	3.10	1.68	2.34	3.17	31.33
1919	1.66	5.51	4.05	.73	1.69	8.33	8.53	5.70	1.76	.28	.23	.19	38.68
1920	1.60	2.61	4.65	7.40	1.96	2.45	4.68	7.02	8.30	.06	3.07	3.00	46.81
1921	1.58	1.26	2.86	2.06	5.92	.61	18.61	5.70	5.19	1.70	1.82	.51	45.82
1922	2.48	5.63	3.15	1.50	8.58	3.54	8.02	5.18	1.13	5.72	.10	4.61	50.62
1923	2.21	1.03	2.36	1.06	6.30	3.56	7.23	12.29	2.11	2.88	1.79	3.91	46.58
1924	3.24	1.57	3.68	5.76	2.36	2.39	6.58	8.26	11.65	1.66	.72	2.93	51.07
1925	4.85	1.84	1.28	1.89	1.96	5.49	2.38	1.62	1.94	3.06	3.09	4.00	33.42
1926	5.02	3.03	3.61	2.48	2.33	5.65	4.29	2.36	2.66	.85	1.90	.92	35.12
1927	.63	2.17	2.97	.83	.71	4.10	4.81	8.78	1.23	2.37	.46	1.19	29.88
1928	.43	7.44	3.08	2.54	1.05	2.75	5.18	2.62	14.30	1.07	1.03	1.09	42.78
1929	4.66	4.86	2.05	1.88	4.30	4.81	6.07	5.22	3.88	1.71	2.00	3.54	44.98
1930	2.37	.81	4.17	2.60	.76	6.59	6.09	1.75	3.22	.79	1.23	2.05	32.43
1931	2.37	1.67	2.88	.92	1.12	2.46	6.88	4.93	2.08	.71	.53	2.25	28.60
1932	.96	1.17	2.62	.31	5.64	6.59	4.03	8.42	7.18	6.98	2.24	.68	44.84
1933	3.85	5.93	.99	2.29	1.76	2.72	8.12	8.69	13.04	2.81	2.25	.40	52.65
1934	1.80	3.07	1.16	1.72	5.41	1.68	2.35	7.05	4.04	5.73	2.64	2.18	38.83
1835	2.27	1.93	1.02	1.12	7.08	3.45	17.78	9.53	5.53	.14	1.48	2.72	54.06
1936	2.54	3.45	5.51	2.20	1.78	3.08	3.42	8.37	2.47	5.55	.83	2.98	40.20
1837	3.91	4.68	1.84	6.55	1.80	3.11	9.62	4.08	4.34	2.88	4.86	1.48	48.76
1938	1.12	.76	.33	2.85	3.94	3.10	5.99	3.80	5.24	2.63	.60	1.14	31.10
1938	2.08	8.96	1.87	2.05	2.54	6.83	10.77	8.78	1.18	.88	1.91	1.38	48.04
1940	3.31	3.73	2.62	1.77	2.01	2.07	7.15	18.71	2.18	.08	1.54	2.36	45.49
1841	1.83	2.56	3.55	1.36	.07	11.03	13.39	12.77	.78	2.55	2.36	10.58	62.63
1942	2.88	2.84	4.92	.85	2.70	5.30	7.37	4.65	5.23	.01	1.58	2.98	41.37
1943	3.49	.64	5.49	2.69	2.78	2.93	8.61	1.35	2.41	.05	1.25	4.47	38.17
1944	3.30	7.18	10.51	4.77	.95	4.76	4.29	3.24	4.85	4.35	2.01	.92	51.23
1945	1.55	4.02	1.07	4.62	2.32	7.12	17.25	11.57	16.24	2.98	1.31	4.82	74.67
1946	3.63	3.03	3.60	2.60	4.52	4.94	10.45	4.90	3.31	2.68	4.34	.57	48.97
1947	1.06	.36	7.28	4.37	2.79	10.76	7.69	6.79	10.18	3.53	8.28	6.14	67.41
1948	3.88	3.51	8.29	4.88	7.05	2.10	10.30	4.10	7.71	2.84	3.50	3.32	61.28
1949	.68	2.56	1.80	2.08	6.19	4.12	5.64	11.45	6.18	1.80	.75	.83	46.05
1950	.60	.28	5.13	.93	3.20	1.21	12.98	5.14	5.66	2.60	1.16	4.21	43.35
1951	.89	1.18	3.74	1.61	.96	4.99	5.75	3.82	8.07	1.75	2.05	3.20	36.23
1952	.98	5.51	3.88	4.14	2.54	1.74	2.92	5.10	7.87	1.13	1.50	2.11	38.20
1853	1.80	4.29	3.65	1.01	.85	7.37	6.15	7.03	4.41	.67	1.52	5.16	44.03
1954	1.31	.42	1.96	1.27	4.13	.47	5.23	.18	5.20	5.56	1.48	3.60	31.02
1955	4.49	1.56	0.47	2.97	4.00	2.86	4.10	3.35	13.63	1.24	0.92	0.69	40.46
1956	1.99	2.06	2.58	2.87	1.81	4.97	5.80	4.24	5.58	1.95	0.59	1.29	35.13
1957	1.06	3.27	3.88	1.49	5.87	5.93	7.48	4.78	8.25	2.38	3.07	3.35	51.78
1858	4.53	2.40	4.94	6.63	1.33	5.62	2.54	4.92	5.94	2.68	0.61	2.22	44.36
1959	3.73	4.60	7.58	1.62	4.43	1.19	7.71	2.79	9.94	11.74	1.56	1.73	58.64
1960	4.36	4.42	3.49	1.54	1.45	3.25	11.74	3.76	8.17	1.46	0.77	2.09	46.50
1961	1.96	4.73	5.27	5.13	4.09	6.53	1.95	11.75	1.21	3.71	1.26	1.32	46.91
91Yr. (1871-1961) RECORD MEAN	2.84	3.21	3.44	2.76	3.22	4.60	7.09	6.40	5.39	3.16	2.16	2.77	47.04

NORMALS, MEANS, AND EXTREMES

Precipitation							Wind				
									Fastest mile		
Normal total	Maximum monthly	Year	Minimum monthly	Year	Maximum in 24 hrs.	Year	Mean hourly speed	Prevailing direction †	Speed	Direction	Year
(b)	88		88		86		27	9	47		
2.48	7.83	1878	0.19	1898	3.98	1884	9.9	SW	61		1930
3.07	10.45	1874	0.28	1950	4.77	1944	10.6	WSW	52	NW	1946
3.38	10.51	1944	0.33	1938	4.07	1936	10.9	SSW	72		1942
2.45	15.00	1877	0.17	1904	8.30	1877	11.0	SSW	65	E	1956
3.36	9.56	1922	0.07	1941	5.88	1915	10.2	S	66		1934
4.29	18.50	1893	0.27	1918	6.01	1945	9.6	SW	54	NW	1945+
8.04	17.78	1935	1.05	1875	8.56	1950	9.3	SW	60		1935
6.54	19.18	1885	0.18	1954	8.55	1940	9.4	SW	73		1940
5.31	16.24	1945	0.40	1901	10.57	1933	10.1	NNE	76		1933
2.44	14.32	1876	0.01	1942+	9.55	1876	10.2	NNE	56		1932
1.92	7.54	1888	0.10	1922	5.84	1889	9.8	NNE	49		1933
2.71	10.56	1941	0.03	1889	3.46	1685	9.7	SW	73	NE	1947
45.99	19.18	Aug. 1885	0.01	Oct. 1942+	10.57	Sept. 1933	10.1	SW	76		Sept. 1933

TABLE SHOWING RAINFALL IN INCHES FOR SELECTED DURATIONS*

	30 Min.	1 Hour	2 Hours	3 Hours	6 Hours	12 Hours
1 Year	1.5	1.8	2.2	2.3	2.7	3.3
2 Years	1.7	2.2	2.6	2.7	3.3	4.0
5 Years	2.1	2.6	3.3	3.5	4.3	5.1
10 Years	2.3	2.9	3.7	4.1	4.7	6.5
25 Years	2.7	3.4	4.2	4.7	5.8	6.9

* U. S. Weather Bureau Technical Paper No. 40 - "Rainfall Frequency Atlas of the United States".

Charleston, S. C. The average yearly rainfall of 47.04 inches would not cause a serious drainage problem if it were evenly distributed. The most serious drainage problem is created by the high intensity, short duration rain storms occurring during periods of high tides and prevailing easterly winds. The design of drainage systems and supporting structures is related to the amount of runoff that can be expected from storms of differing intensities and duration.

ROAD FLOODED--Heavy rains flooded sections of Magnolia Garden Road. Adequate outlets would have carried off this excess water.

FLOODED SUBDIVISION - With disruption of utilities and property damage.

Soils

A description of soil groups in Charleston County is contained on pages 13 - 17. Table No. 2 contains information relative to the engineering and other properties of soils.

Soils have characteristics which decidely influence the need for, and the degree of, drainage. Some of the more important characteristics are: the rate of water movement through the soil (permeability), soil texture, water table depth, and slope of the land. A knowledge of these characteristics as well as of the engineering properties of soils is essential in planning, designing and constructing an adequate drainage system.

Heavy textured soils have little or no subsurface water movement and can be drained only by positive removal of surface water by shallow surface ditches. Sandy soils having high water tables or fluctuating water tables, respond to sub-surface drainage, but present problems in stabilization and design of open ditches. These problems include: (a) side slope sloughing, which limits the depth of cuts; (b) limitation of the velocity of flow; and (c) sedimentation.

Culverts

Culverts for road and railroad drainage generally lack capacity to handle runoff from high intensity storms and are frequently installed with invert elevations too high. They are a serious bottleneck to the rapid disposal of runoff and cause local flooding. The problem is less severe on primary roads than on secondary roads. Culverts are almost universally inadequate on unpaved and farm roads.

Drainage structures in driveways paralleling streets and roads in established subdivisions are critical factors contributing to poor local drainage. Head losses alone resulting from the wide spread use of under-designed culverts in residential areas create local flooding problems.

Urbanization

Urbanization of areas adjacent to the City of Charleston is having an adverse effect on drainage. Some of the drainage facilities now in use were established to handle the agricultural needs of the area. They are not adequate to handle runoff resulting from urbanization. Roof tops, paved roads, compaction, raised water tables resulting from septic tanks and tile field installations, grading and elimination of some ditches during urban development, have created conditions approaching 100 percent runoff. As urbanization continues, the present drainage facilities will become increasingly inadequate to handle runoff. However, there has been a marked improvement in recent drainage work due to enactment of Subdivision Regulations which include criteria governing the installation of drainage facilities.

FLOODED SUBDIVISION - Prohibits use of streets and prevents operation of septic tanks.

Table No. 2 Brief Description of Soils and Their

Map Symbol (1)	Soil Name - Typical of Soil Group (2)	Description of Soil and Site (A) (3)	Depth from Surface Inches (4)
6	Bayboro loam	One foot of very poorly drained loam over 2 to 4 feet of plastic sandy clay loam derived from beds of sandy clay. Internal drainage very slow. Seasonal high water table at depth of 4 ft. with perched water table at or near the surface.	0 - 19 19 - 35 35 - 52
6	Bladen fine sandy loam, neutral aubstratum	One foot of poorly drained fine sandy loam over 2 to 4 feet of plastic sandy clay loam derived from beds of sandy clay and sand. Perched water table on or near the surface with true water table at 4 ft. below the surface.	0 - 15 15 - 34 34 - 54
4	Charleston fine sandy loam	1 to 1½ feet of moderately well drained fine sandy loam overlying 2 to 3 ft. of fine sandy loam derived from beds of sandy clay and sand. Seasonal high water table located 2 ft. below the surface.	0 - 16 16 - 44 44 - 52
7	Chewacla-Wehadkee silty clay loams	One foot of silty clay loam underlain by 1½ ft. of silty clay derived from beds of unconsolidated silty clay deposited by streams.	0 - 8 8 - 24
5	Edisto fine sandy loam	1 to 1½ feet of somewhat poorly drained fine sandy loam overlying 2 to 3 ft. of sandy loam to sandy clay loam derived from beds of sandy clay and sand. Seasonal high water table at depth of 1 ft. below the surface.	0 - 15 15 - 38 38 - 45
4	Eulonia loamy fine sand 0 to 2 percent slopes	1 to 1½ feet of moderately well drained loamy sand over 2 to 3 ft. of sandy clay loam derived from beds of sandy clay. Seasonal perched high water table at depth of 1.0 foot below the surface, true water table below 4 ft.	0 - 13 13 - 29 29 - 40
4	Eulonia loamy fine sand, thick surface, 2 to 6 percent slopes	1½ to 2½ feet of moderately well drained loamy sand on 2 to 6 percent slopes over 2 to 3 ft. of sandy clay loam derived from beds of sandy clay. Seaaonal high water table at depth of 2 ft. below the surface.	0 - 26 26 - 40
1	Eustis loamy fine sand, low, 0 to 6 percent slopes	3 to 15 feet of excessively drained sand formed in beds of unconsolidated sands. Seasonal high water table at depth of in excess of 5 ft. below the surface.	0 - 8 8 - 48 48 - 60
1	Eustis loamy fine sand, low 6 to 10 percent slopes	3 to 15 feet of excessively drained sand formed in beds of unconsolidated sand on 6 to 10 percent slopes.	0 - 8 8 - 48 48 - 60
4	Fairhope fine sandy loam 2 to 6 percent slopes, eroded	1/2 to 1 ft. of well drained fine sandy loam, eroded, over 1½ to 3 ft. of sandy clay loam derived from beda of sandy clay. Seasonal high water table at depth in excess of 4 ft. below the surface.	0 - 7 7 - 26 26 - 35
2	Kiawah loamy fine sand	3 to 5 feet of somewhat poorly drained loamy sand over beds of sand or sandy clay. Seasonal high water table at depth of 1 ft. below the surface.	0 - 15 15 - 32 32 - 40
3	Rutlege loamy sand	1 to 1½ feet of poorly drained loamy sand over 1 to 2 ft. of sand derived from beds of unconsolidated sand.	0 - 12 12 - 26
2	Rutlege loamy fine sand, thick surface	1 to 2 feet of poorly drained loamy sand, high in organic matter over 2 to 3 ft. of sand. Seasonal high water table on or near the surface.	0 - 20 20 - 42 42 - 54
3	St. Johna loamy fine aand	1 to 1½ feet of poorly drained loamy sand over 6" to 12" thick hardpan of aand cemented with organic material underlain by 4 to 7 ft. of sand. Seaaonal high water table on or near the surface.	0 - 13 13 - 35 35 - 53
1	Seabrook loamy fine sand	3 to 5 ft. of moderately well drained sand formed in beds of unconsolidated aand. Seasonal high water table at depth of 2½ ft. below the surface.	0 - 9 9 - 42 42 - 54
6	Stono fine aandy loam	1 to 1½ ft. of poorly drained fine sandy loam, high in organic matter, over 2 to 2½ ft. of sandy loam to sandy clay loam derived from beda of sandy clay and aand, Seasonal high water table on or near the aurface.	0 - 20 20 - 42 42 - 50
5	Weaton fine sandy loam	1 to 1½ ft. of somewhat poorly to poorly drained fine sandy loam over 2 to 2½ ft. of aandy clay loam derived from beds of aandy clay. Seasonal high water table 1/2 ft. below the surface.	0 - 8 8 - 46 46 - 54

(A) Wet Weather Water Table:

High - 0 to 18 inches below ground
Moderate - 18 to 36 inches below ground
Low - 36+inches below ground

(B) Permeability Rate Rangea:

Very slowly permeable - lesa than .063 inch an hour
Slowly permeable - .063 to 0.2 inch an hour
Moderately alowly permeable - .2 to 0.63 inch an hour
Moderately permeable - 0.63 to 2.0 inches an hour
Rapidly permeable - 2.0 to 6.3 inches an hour
Very rapidly permeable - greater than 6.3 inches an hour

Estimated Properties Significant to Engineering

Classification			Percentage Passing Sieve			Permeability Rate (B) In. per Hr.	Available Water Capacity In. per In.	Reaction (pH Value)	Dispersion	Shrink-Swell Potential
USDA Texture (5)	Unified (6)	AASHO (7)	No. 4 (8)	No. 10 (9)	No. 200 (10)	(11)	(12)	(13)	(14)	(15)
Loam	ML	A-4	100	100	57	.20 - 0.6	.200	5.1 - 5.5	Low	Moderate
Fine sandy clay loam	SC	A-4 or A-6	100	100	49	.063 - 0.2	.250	5.1 - 5.5	Low	Low to moderate
Fine sandy clay loam	SC	A-4 or A-6	100	100	48	.063 - 0.2	.170	5.1 - 5.5	Low	Low to moderate
Fine sandy loam	SM	A-2 or A-4	100	100	29	.63 - 2.0	.180	5.1 - 5.5	High	Low
Fine sandy clay loam	SC	A-4 or A-6	100	100	43	.063 - 0.2	.170	6.6 - 7.3	Moderate	Low to moderate
Fine sandy clay loam	SC	A-4 or A-6	100	100	38	.063 - 0.2	.170	6.6 - 7.3	High	Low to moderate
Fine sandy loam	SM	A-2 or A-4	100	100	31	.63 - 2.0	.130	5.6 - 6.0	High	Low
Fine sandy loam	SM	A-2 or A-4	100	100	36	.63 - 2.0	.110	4.5 - 5.0	High	Low
Fine sandy loam	SM	A-2 or A-4	100	100	28	.63 - 2.0	.110	5.1 - 5.5	High	Low
Silty clay loam	MH or CL	A-7 or A-5	100	100	90	.063 - 0.2	.100	5.6 - 6.0	Moderate	Moderate
Silty clay	CL	A-7 or A-6	100	100	95	.063 - 0.2	.125	5.6 - 6.0	Low	High
Fine sandy loam	SM	A-2 or A-4	100	100	38	.63 - 2.0	.130	5.1 - 5.5	High	Low
Fine sandy loam	SM	A-2 or A-4	100	100	43	.63 - 2.0	.110	4.5 - 5.0	Moderate	Low
Fine sandy loam	SM	A-2 or A-4	100	100	42	.63 - 2.0	.110	4.5 - 5.0	Moderate	Low
Loamy fine sand	SP-SM	A-2 or A-3	100	100	42	.63 - 2.0	.107	5.1 - 5.5	Moderate	Low
Fine sandy clay loam	SM	A-2 or A-4	100	100	46	.20 - .63	.180	4.5 - 5.0	Low	Low to moderate
Fine sandy clay loam	SM	A-2 or A-4	100	100	28	.20 - .63	.180	4.5 - 5.0	High	Low to moderate
Loamy fine sand	SM	A-2 or A-4	100	100	28	.63 - 2.0	.080	5.1 - 5.5	High	Low
Fine sandy clay loam	SC	A-4 or A-6	100	100	40	.20 - .63	.180	4.5 - 5.0	Moderate	Low to moderate
Loamy fine sand	SM	A-2 or A-4	100	100	16	6.3+	.078	6.1 - 6.5	High	Low
Loamy fine sand	SP-SM	A-2 or A-3	100	100	12	6.3+	.077	6.1 - 6.5	High	Low
Fine sand	SP	A-3	100	100	20	6.3+	.077	6.1 - 6.5	High	Low
Loamy fine sand	SM	A-2 or A-4	100	100	16	6.3+	.060	6.1 - 6.5	High	Low
Loamy fine sand	SP-SM	A-2 or A-3	100	100	12	6.3+	.050	6.1 - 6.5	High	Low
Fine sand	SP	A-3	100	100	20	6.3+	.050	6.1 - 6.5	High	Low
Fine sandy loam	ML	A-2 or A-4	100	100	54	.63 - 2.0	.180	5.6 - 6.0	Low	Low
Fine sandy clay loam	SC	A-4 or A-6	100	100	46	.20 - .63	.180	4.5 - 5.0	Low	Low to moderate
Fine sandy clay loam	SC	A-4 or A-6	100	100	28	.20 - .63	.180	4.5 - 5.0	High	Low to moderate
Loamy fine sand	SM	A-2 or A-4	93	93	23	2.0 - 6.3	.100	5.6 - 6.0	High	Low
Loamy fine sand	SM	A-2 or A-4	93	93	17	6.3+	.080	5.6 - 6.0	High	Low
Fine sand	SP	A-3	100	100	15	6.3+	.077	5.6 - 6.0	High	Low
Loamy sand	SM	A-2 or A-4	100	100	45	.630 - 2.0	.125	5.1 - 5.5	High	Low
Sand	SM	A-2 or A-4	100	100	30	2.0 - 6.3	.077	5.1 - 5.5	High	Low
Loamy fine sand	SM	A-2 or A-4	100	100	23	.63 - 2.0	.180	5.1 - 5.5	High	Low
Loamy fine sand	SM	A-2 or A-4	100	100	19	6.3+	.107	5.1 - 5.5	High	Low
Loamy fine sand	SM	A-2 or A-4	100	100	24	6.3+	.077	5.1 - 5.5	High	Low
Loamy fine sand	SM	A-2 or A-4	100	100	30	6.3+	.080	4.5 - 5.0	High	Low
Fine sand (weakly cemented)	SP	A-3	100	100	21	.63 - 2.0	.077	4.5 - 5.0	High	Low
Fine sand	SP	A-3	100	100	19	2.0 - 6.3	.077	5.1 - 5.5	High	Low
Loamy fine sand	SM	A-2 or A-4	100	100	26	6.3+	.100	5.6 - 6.0	High	Low
Loamy fine sand	SM	A-2 or A-4	98	98	23	6.3+	.075	5.1 - 5.5	High	Low
Loamy fine sand	SM	A-2 or A-4	100	100	22	6.3+	.075	5.1 - 5.5	High	Low
Fine sandy loam	SM	A-2 or A-4	100	100	44	.63 - 2.0	.160	4.5 - 5.0	Moderate	Low
Fine sandy clay loam	SC-SM	A-2 or A-4	96	94	40	.63 - 2.0	.170	5.6 - 6.0	Moderate	Low
Loamy fine sand	SM	A-2 or A-4	100	100	24	2.0 - 6.3	.075	5.6 - 6.0	High	Low
Fine sandy loam	SM	A-2 or A-4	100	100	23	.63 - 2.0	.110	5.6 - 6.0	High	Low
Fine sandy clay loam	SC	A-4 or A-6	100	100	41	.20 - .63	.170	6.1 - 6.5	Moderate	Low to moderate
Fine sandy loam	SM	A-2 or A-4	100	100	29	.63 - 2.0	.130	6.6 - 7.3	High	Low

Existing Drainage System

With the exception of some recently excavated canals, drainage systems in rural and urban areas are generally inadequate in depth and capacity, and have very flat grades. An important additional factor contributing to this problem is the lack of legal authority to secure adequate rights-of-way for proper ditch design, spoil management, and access for maintenance. Rights-of-way in the past were usually limited to the width which the landowner was willing to donate, which in most cases was less than thirty feet.

Existing flat grades are the result of discharging canals - (1) into tidal marshes at Mean Sea Level Elevation rather than at Mean Low Water Elevation, or (2) discharging into swamps which are not adequate outlets in their present state since they generally pond water for long periods of time following heavy rainfall.

Existing canals are usually located in natural water courses. However, in many instances alignment is poor, since attempts were made to accomodate the canals to existing property lines or other physical features inconsistent with good channel flow conditions.

Maintenance

Lack of adequate maintenance is a factor affecting the capacity of canals. The existing drainage canals in most of the county were dug by hand many years ago; some of them were enlarged by the Works Progress Administration in the 1930's. They have nearly vertical side slopes, with spoil placed immediately next to the ditch. Practically all canals have high spoil banks which are covered by heavy growth of trees and brush, making access very difficult. The spoil banks' being continuous for long distances prevents surface drainage from adjacent areas and results in ponding. The extent of machine maintenance is limited at preent due to these conditions and also to the lack of legal easements permitting access.

Drainage Principles

The purpose of this report is to present a plan for the location and needed capacities of main drainage canals. This is, however, only the first step in the establishment of a complete drainage system. Drainage systems are divided into two broad categories - surface drainage and sub-surface drainage.

Surface Drainage - removes excess water, by gravity, from the land surface to an outlet. Surface water can best be moved by shallow channels or by grading the land surface to a uniform slope primarily on cultivated land. To insure water movement along the surface to an outlet without ponding is a very important function of the drainage system. Surface drainage facilities are particularily applicable to soils having slow permeability rates, to the drainage of low pockets to prevent water from ponding, and to the diversion of water from protected areas. They also collect and convey water to natural channels or to constructed canals.

Sub-surface Drainage - removes water from beneath the surface of the soil by facilities which create a difference in hydraulic head. The resulting hydraulic head causes water to move through the soil to an outlet. Sub-surface drainage may be accomplished by open ditch drains or by tile drains. Open ditch drains have an added advantage because they can also collect and remove surface water. Tile drains, with certain precautions, can also remove surface water by simulating a small storm sewer system.

The purpose of sub-surface drainage is to lower the water table to a point where it will not interfere with plant growth or the use of land for residential or other purposes. The minimum depth below the surface at which water tables should be maintained depends on the use of the land. Water tables, fluctuating upwards to or near the surface, may not be as great a problem in agricultural areas as they would be in populated areas.

The component parts of a Drainage System are as follows:

The Collection System - is that part of the drainage system which first picks up water from the land. It may consist of shallow trapezoidal ditches, having flat side slopes; V- or W-type ditches, bedding or grading the land surface in open agricultural areas, or storm sewers in urban areas. This is a part of the drainage system which cannot be neglected if the system is to perform adequately.

The Disposal System - receives water from the collection system and conveys it, usually in an open channel, to the outlet. Generally, this report concerns itself with this part of the drainage system.

The Outlet - is the end point of any segment of a drainage system beyond which the ditch, storm sewer, or the system no longer guides or controls the water it discharges.

Drainage Requirements

The drainage system should be designed so that flooding will not occur in critical parts of the watershed for a period of time sufficient to cause damage or disrupt utilities and services. For urban areas, design should provide for the removal of runoff from the design storm with a minimum of flooding. In agricultural areas, the degree of protection required by crops varies considerably, depending on their tolerance to the amount and duration of excess water. Truck crops are the most susceptible to excess surface water, with damage occurring to some when flooded for the relatively short period of 24 hours or less. General crops such as corn and grain are less susceptible, with pasture being the least subject to water damage. Woodland areas are not appreciably damaged by flooding for prolonged periods, except that seed-fall may not germinate due to surface water conditions, causing failure in securing a stand.

Poorly drained soils adversely affect the use of the land for most purposes. On agricultural

FLOODED FIELD - This field of cucumbers was flooded for the second time in a month because of lack of proper drainage.

land, high water tables restrict root penetration; soil temperature is lowered, air circulation is severely limited, dependent on the degree of soil saturation, and soil structure is adversely affected. Wet spots in the field delay farm operations and shorten the growing season.

Poorly drained soils in residential areas, in addition to their effects on ornamental plants and lawns, adversely affect the construction, maintenance, and use of roads and streets. They also limit or prohibit the development of some areas, preventing the proper functioning of septic tank tile fields, and contribute to health hazards.

Design Criteria

The design of drainage systems and supporting structures is based on Hydrology and Hydraulics and this report will limit itself to the application of these sciences as they apply to the solution of such problems. References for more detailed information on design of open channels, closed conduits, culverts, dikes, pumps, tide gates, and other engineering structures ultimately involved in establishing a drainage system are listed on pages 23 - 54.

Drainage Coefficients

The drainage coefficient is the rate of removal of runoff to provide a specific degree of drainage protection to an area. Land use, soils, topography, and rainfall intensities and duration determine the selection of drainage coefficients. A series of four curves have been developed from which required drainage capacities of open ditches can be computed, dependent on the land use. (See Figure No. 1) The highest curve is for urban use followed in descending order for truck crops, general crops, and woodland.

The use of these curves provides for the removal, in 24 hours time, of the following amounts of runoff:

Urban curve	- 4.39 inches
Truck crops	- 3.33 inches
General crops	- 1.67 inches
Woodland	- 0.37 inches

The curve for urban areas reflects a peak runoff for a 10-year frequency.

Velocity

Soil characteristics, the shape of the channel, and available means for stabilization of the soil after construction, determine the maximum safe velocity. The optimum velocity for channels, based on soil conditions in Charleston County, is approximately 2 feet per second. The soils are predominently fine sands. Sedimentation occurs when velocities are less than 1½ feet per second which is frequently caused by vegetative growth. Erosion will occur in most soils at velocities in excess of 3 feet per second. Design of channels in the fine water bearing sands must consider the need for checking erosion and bank caving that will occur immediately following construction when water tables are high.

Velocities should be designed after a thorough investigation of soil conditions to the depth of proposed channels.

Channel Cross Section

Values of Roughness Coefficient "n"

All channel cross sections were computed by use of Manning's formula for determining velocities. This is:

$$V = \frac{1.486}{n} \times r^{2/3} \times s^{1/2}$$

where: n = Roughness coefficient.
r = Hydraulic radius
s = Slope in feet per foot along the ditch.

The proper design of a ditch cross section required the selection of the proper value of "n". Side slopes of the ditch as well as depth and allowable velocities are fixed primarily by soil conditions and proposed maintenance methods.

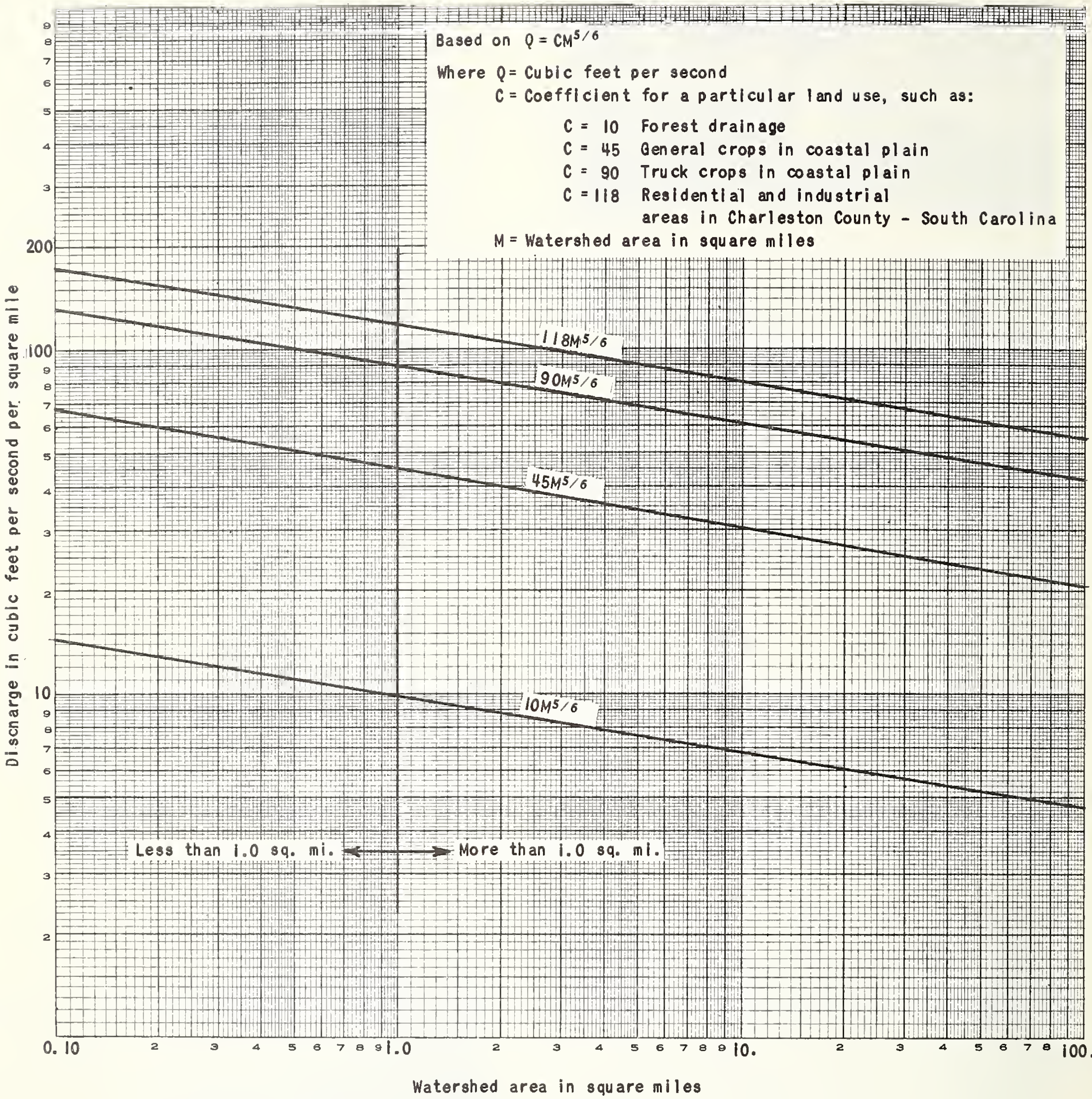
The following tabulations were used for selection of values or "n" for Manning's formula in the design of main canals with good alignment:

Hydraulic Radius*	"n"
less than 2.5	.045
2.5 to 4.0	.040
4.0 to 5.0	.035
over 5.0	.030

* The hydraulic radius is obtained by dividing the proposed area of a channel cross section by its wetted perimeter.

MAIN DRAINAGE CANAL - Good alignment and spoil management.

Figure No. 1 - Drainage Coefficient Curves



In newly dug channels, roughness is lower and velocities higher. A realistic roughness coefficient was selected anticipating flow retardance features, such as vegetative growth and sediment several years after construction. Where the design velocity was near an erosive value, corrective measures were planned.

Channel Depth and Width

Depth of channel was an important design consideration. The channel must be deep enough to tap and provide for the escape of ground water, and to provide for the safe entrance of the longer lateral ditches and tile drains. Other considerations favoring a deeper channel with a resulting narrower bottom width are: less right-of-way is required, vegetative growth on the wetted perimeter is reduced, and conditions are less favorable for the formation of sand bars. All these impede the flow of water. A channel roughly as deep as its bottom width - within economic limits - will remain effective for a longer period because it has the most favorable hydraulic characteristics.

A minimum bottom width of 3.0 feet was designed for main channels, which conforms to a bucket width of small dragline excavating equipment. Bottom widths were selected as narrow as design and construction criteria would permit, so as to obtain higher velocities which, in many instances due to low gradients, were not high enough to prevent formation of sediment islands and growth of vegetation in channel bottoms.

Side Slopes

Maintenance methods, soil characteristics, and a need for adequate but economic minimum rights-of-way determined the side slopes of channels. Side slopes of 1 to 1 for main channels were used to satisfy these conditions.

Sloughing of side slopes may be expected, immediately after excavation in fine sands having high water tables. Sloughing will continue until the water table becomes established at the lower level. The problem can be controlled somewhat in wide channels by requiring initial construction of a pilot channel to lower the water table followed by final construction when the channel has been stabilized; or by requiring a maintenance operation to restore design cross section soon after the channel has stabilized.

Design at Culverts

Culberts obstruct the flow of water in ditches and cause a loss in head. This was considered in designing main channels. The hydraulic gradient was set low enough so that the profile of the water surface at the culvert during design flow was well within the channel cross section in all critical areas.

In Areas 1, 2, and 3, which are relatively highly developed urban areas, the formula: $Q = AC\sqrt{2gh}$ (where "C" is the total significant loss coefficient), was generally used in determining culvert sizes with allowable head ("h") not exceeding 1.5 feet. This head did not result in excessive tail velocities.

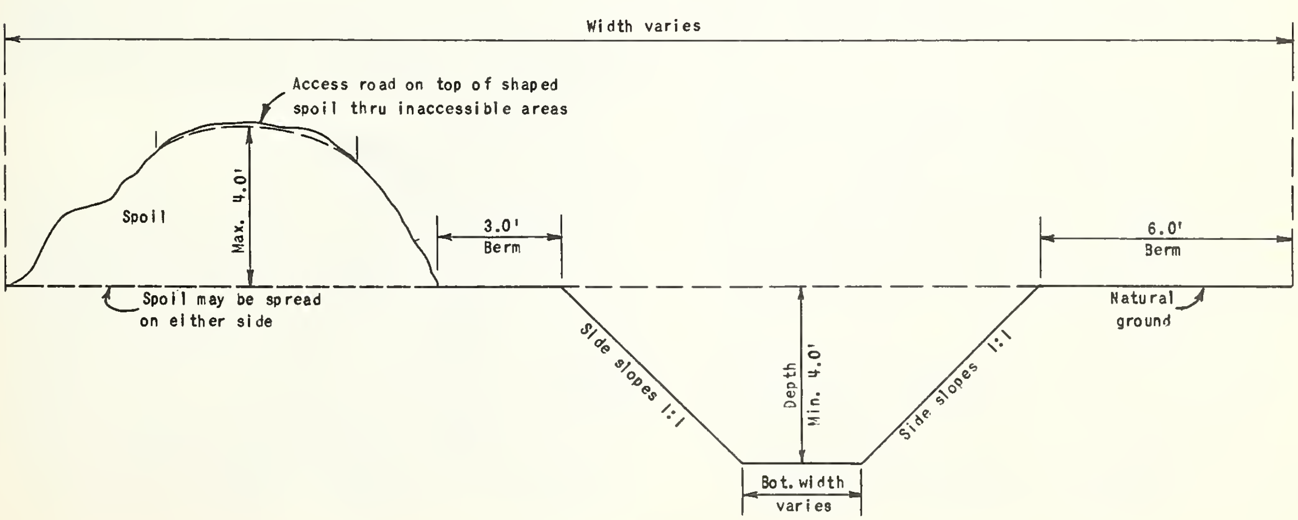
In the remaining areas, Talbot's formula was used in determining culvert sizes, at the suggestion of the Charleston County Public Works Department, since it is their policy and the policy of the South Carolina State Highway Department to use this formula in culvert design.

Where culvert sizes exceeded 66 inches in diameter, it was found more economical to use 15-foot precast reinforced concrete bridges.

Right-of-way Requirement - Berm Width, Spoil Bank

Factors governing widths of rights-of-way can best be understood by consulting Figure No. 2.

Figure No. 2 - Typical Main Ditch Cross-Section Showing Basis For Determining Right-Of-Way Width



The principal requirements for berm width include a work area for spoil shaping so as to prevent erosion or spoil material into the canal, provide a means for travel by maintenance equipment, and reduce the load near the edge of ditch banks to prevent sloughing. Where unstable soil conditions will require it, and the problem of securing wide easements is not a factor, a 15-foot berm width is optimum. Narrower berm widths are feasible where the spoil is to be shaped and a roadway established on top of the spoil.

Dikes, Conduits and Pumps

Needs and Location

An integral feature of the water disposal plan is the establishment of dikes across tidal inlets at selected sites to control tide water intrusion into the major outlets, and provide a basin behind the dike for runoff storage during periods of high tides and high intensity rainfall. Where the capacity of the storage basin is sufficient to store runoff water during a short duration storm occurring at high tide, the runoff water can be discharged during the low tide cycle through conduits equipped with tide gates or through a low gravity flow section through the pump structure. However, where the storage is limited, the storms prolonged, and prevailing winds result in a relatively high tide level, pumps will be required to maintain a safe level of water in the storage basin to prevent damage in highly developed residential or truck crop areas.

The combination of dikes, tide gates, and pumps will provide protection during times when the drainage canals cannot discharge by gravity. These conditions occur frequently enough to justify costs. It is during these times that extensive property and crop damage occurs, usually with resultant disruption of public facilities. (See Figures 3 and 4)

Design Criteria

Available records indicate that average storm tides (excluding hurricane tides) occur at 8.0 feet above mean low water. Design of dikes, with top elevation of 10.0 feet above mean low water, 3:1 side slopes and 12.0-foot top width, is considered a minimum requirement for adequate protection.

Pumping lift, topography, and foundation conditions are factors which influenced the location of pumps. The axial flow or propeller-type pump was used in determining costs since it is especially adapted for low head pumping.

In most cases two pumps were planned for each installation with each pump having one-half the total needed capacity. Adequate trash racks, suction bays, discharge bays and low-flow gravity chambers were planned.

Reinforced concrete structures for pumps, gates, conduits and trash racks are planned to be located at abutment ends of dikes where good foundation conditions exist. Pumps were planned at an elevation sufficient for protection from inundation during abnormally high tides. Locations were also planned for ease of access and maintenance. (See Figures 3 and 4)

Low head drainage pumps and reinforced concrete pump structure and trash racks.

Description of Areas

The County was divided into twelve Areas to delineate the drainage needs peculiar to these Areas and to facilitate planning. A brief description of drainage problems associated with each Area follows. (See Figure 5)

Area 1 - James Island

A rapid change from agricultural to urban use is taking place on James Island. It is a trend that is expected to continue. The existing drainage on James Island was installed to take care of the agricultural needs of the Island and not for urban development. There is an opportunity on James Island to install adequate drainage facilities and related engineering structures before the Island becomes totally urbanized. This work can now be accomplished at less cost and with a minimum of difficulty in acquiring rights-of-way. Encroachment of developments on areas exposed to storm tides makes special protective measures such as dikes, tide gates, and pumps, necessary. James Island has a higher proportion of well drained high land than the other Areas in the County.

Area 2 - St. Andrews

This area is largely residential and is almost totally occupied by residential subdivisions and large commercial centers, with undeveloped, very poorly drained sections scattered throughout the area. Most of St. Andrews was highly developed prior to enactment of Subdivision Regulations which include criteria for drainage design. The drainage problem in St. Andrews is very severe. Flooding occurs very frequently, causing a good deal of damage to property and disrupting of utilities. The existing drainage systems were poorly planned and under designed. They were established as a means of expediency in an

Figure No. 3 - Typical Profile and Cross-Section - Dike and Pump Structure

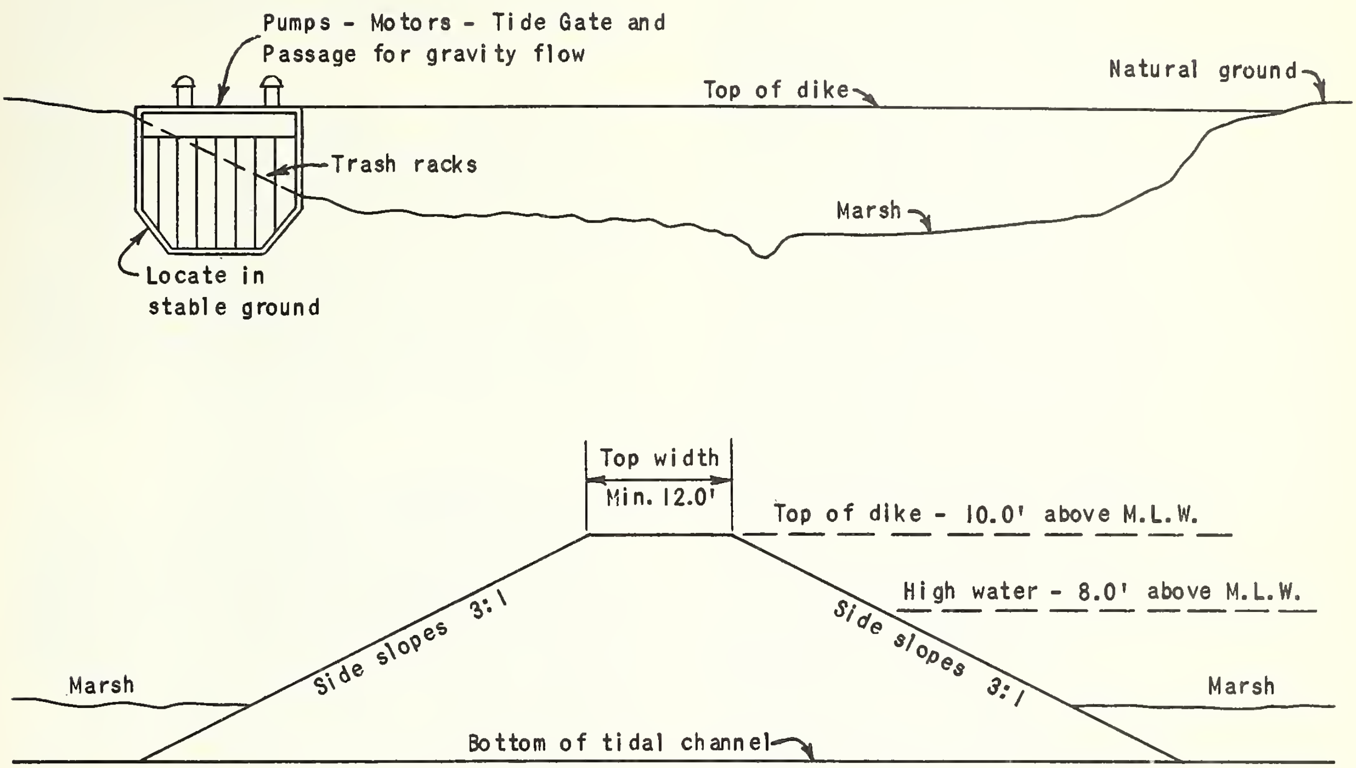
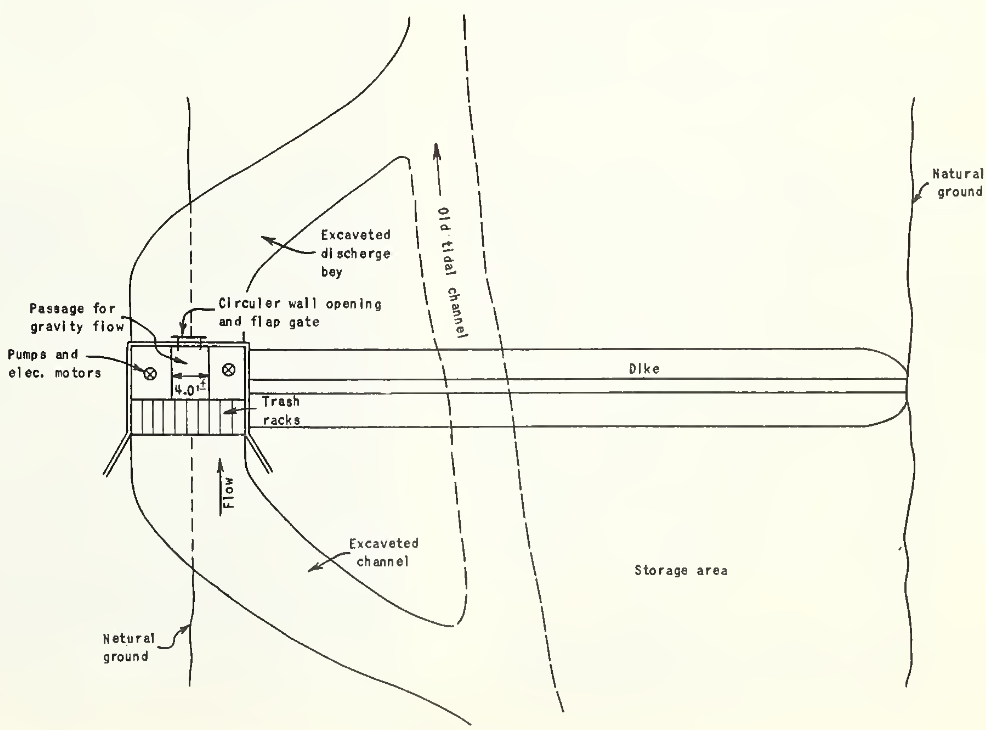


Figure No. 4 - Plan View Showing Typical Installation of Dike -
R/C Pump Structure - Tide Gate and Channels



attempt to keep up with rapid urbanization. Drainage is further complicated by drainage structures under railroads, highways, and numerous inter-connecting roads and streets. The establishment of adequate drainage in this area will be very expensive, due to the cost of right-of-way acquisition through thickly settled residential areas and commercial centers. Encroachment of developments on areas exposed to storm tides and expected use of poorly drained sections, makes special protective measures such as tide gates, dikes, and pumps necessary.

Area 3 - North Charleston - Ladson

For the most part, this Area is totally occupied by residential developments, industrial centers, railway yards, Federal installations (Navy Yard, Air Base, and other defense installations) and large commercial centers. Most of this Area was developed prior to enactment of Subdivision Regulations governing installation of drainage facilities. The highest elevation in the county, 70 feet above mean sea level, occurs in the Lincolnville section.

This Area has the most complicated drainage problem in the County. The existing drainage system was established with inadequate allowance for eventual developments. Drainage structures for main line railroads and spur tracks, principal highways and inter-connecting roads and streets complicate and impede drainage in many instances. Underground storm drains in commercial and residential areas are inadequate to handle runoff, which results in frequent flooding. Numerous underground facilities such as gas lines, electric cables, water mains and sewage lines further complicate the problem. This highly concentrated area is confined in a relatively narrow section between the Ashley and Cooper Rivers. Drainage improvements will be very expensive due to the high cost of right-of-way acquisition through existing developments. Encroachment of developments on areas exposed to storm tides also makes special protective measures such as dikes, tide gates, and pumps necessary.

Area 4 - Johns Island

Johns Island is largely agricultural, with residential developments beginning to take place along the Maybank Highway and the River Road. It is expected that in time, large sections of Johns Island will become urbanized, and plans for drainage should anticipate this eventual development.

The soils on Johns Island are generally poorly drained, with relatively high water tables. The better drained soils occur along the roads and highways and along tidal creeks. The topography is very undulating, with the intervening low places between ridges being very wet and swampy. Generally, the watersheds are larger than those in other areas.

Area 5 - Mt. Pleasant - Awendaw

This area is divided into broad topographical sections. The section nearest the City of Charleston is urbanized and can be expected to expand north along Highway 17 and onto the remaining farm land north of Mt. Pleasant. The portion in the vicinity of Awendaw is rural - some of it is contained within the U. S. National Forest.

U. S. Highway 17 is generally located along the watershed divide between the Inland Waterway and the Wando River. The existing drainage facilities are generally well located, but inadequate as to capacity and depth. The soils range from moderately well drained along U. S. Highway 17 and the vicinity of Mt. Pleasant to poorly drained in the remainder of the Area.

As urbanization continues in the Mt. Pleasant section, the need for drainage improvements will become more and more critical. These improvements should anticipate expected developments which can now be established without too much difficulty and at a reasonable cost.

Area 6 - Meggett - Hollywood

This Area contains the highest concentration of truck farms in the county and is entirely agricultural. Good drainage is essential to the production of truck crops. Most truck farms are located along tidal creeks, south of Highway 162 where better drained soils, well suited to truck crops, are found and where outlets into tidal creeks are readily available. Farms not so located require main drains to tidewater for disposal of runoff.

The section north of Highway 162 is not generally suited for agriculture, due to soil characteristics and very poor drainage. The topography is flat, with large depressions which pond water.

Drainage in Area 6 is somewhat complicated by railroad spur lines that serve individual farms, and by numerous interconnecting paved and unpaved roads that serve the Area. The proximity of truck farms to areas exposed to storm tides makes special protective measures such as dykes, tide gates and pumps necessary.

Areas 7 and 8 - Wadmalaw Island and Edisto Island

The interior of these Areas is largely woodland with truck farms located along tidal creeks and rivers. The soils are moderately to poorly drained, with the better drained soil occurring along the principal roads and creeks. The drainage problems here are not severe as compared to other Areas. The watersheds are relatively small in size and adequate outlets are readily available.

Area 9 - Mc Clellanville

Most of this area is contained within the U. S. National Forest with random farms and small holdings along U. S. Highway 17 and within the National Forest. This area has large watersheds, extending into adjacent Berkeley County, and their drainage is to the Santee River and to the Inland Waterway. The topography is flat, with broad swamps having poorly defined drainage patterns. This section is the most poorly drained of all the Areas in the County. Drainage requirements of woodland are minimum, and since the Federal Government is the principal owner, it is expected that drainage facilities within the National Forest will be installed by them, in cooperation with private landowners, as needed.

Area 10 - Parkers Ferry

This Area is entirely woodland with ownership vested in a Pulp and Paper Company and other private owners. The soils are poorly to very poorly drained except areas along the Edisto River. This Area receives runoff water from Areas 6 and 12 and the drainage plan is coordinated with these Areas. The Edisto River forms a readily available outlet for drainage systems. The drainage requirements are minimum, due to the land use.

Area 11 - Bear Swamp

This Area is woodland, with large private owners. A large part of this Area was strip-mined for phosphate and is characterized by a corrugated pattern of ridges and depressions resulting from the mining operation. The natural drainage in the mined section has been totally disrupted. Church Creek and the Ashley River are the natural outlets.

Area 12 - Caw Caw Swamp

This Area is owned for the most part by a Paper and Pulp Company. Considerable drainage facilities have been installed by the company for access and management. These facilities, with some additions, are considered adequate for the anticipated land use for this Area. The Area is characterized by broad swamps with large watersheds eminating from Dorchester County and discharging into the Wallace River, Caw-Caw Swamp, or the Edisto River. The soils are poorly drained and are generally low in elevation, which results in frequent flooding. The better drained soils occur along the Edisto River and along the Dorchester County line.

Right-of-way clearing for Main Drainage Canal.

Reconnaisance Soil Survey

Description of Soil Groups and Their Drainage Problems

Soil surveys in Charleston County are classified into Detailed and Reconnaissance Surveys according to the method and resulting precision of mapping. A Detailed Soil Survey is one in which the location of each soil boundary plotted on a map is observed at moderate intervals throughout its course. A Reconnaissance Soil Survey is one in which the boundaries between soils are sketched from observations made at very wide intervals and not necessarily throughout their whole course. A recconnaissance soil survey boundary encloses several kinds of soils whereas a detail survey boundary encloses but one kind of soil.

There are about 80 different soils in Charleston County. These soils have been placed in 14 soil groups in the Reconnaissance Soil Survey. Groups 1 to 7 contain soils that have well defined soil horizons. These soils have been grouped according to natural drainage class and texture of the subsoil. For example, Soil Group 1 contains soils that are well drained and have deep sandy subsoils. Groups 8 - 14 are miscellaneous land types that do not have well defined soil horizons. These groups contain soils such as tidal marsh, dune land, or swamp. The soils in each group are listed in descending order of their total acreage in the group - that is, the first soil has a greater acreage than the second soil.

Each soil boundary shown on the Reconnaissance Soil Map usually contains one to three of the soils listed in the Soil Group description. Seldom does a boundary contain all the soils listed, except for the Soil Groups that have only one or two soils in them. Table No. 3 lists the acreage of each Soil Group that occurs in each Area.

Soil Group 1 (Map Symbol 1)

Well Drained and Moderately Well Drained Soils with Loamy Sand to Sand Subsoils.

This group contains brown to brownish yellow, deep sandy soils that occupy nearly level to sloping relief. They are usually higher in elevation than the surrounding soils, are broadly distributed over the County and are extensive in area. These soils have few, if any, drainage problems. The water table is low and internal drainage is very rapid. They have low available water capacity, are low in organic matter and natural fertility. They are well suited for residential and industrial purposes and fair to poor for agricultural and recreational uses.

Soil Group 1 contains the following soils:
- Eustis loamy fine sand, low, 0 to 6 percent slopes
- Seabrook loamy fine sand
- Eustis loamy fine sand, low, shallow, 0 to 2 percent slopes

Table No. 3

SUMMARY OF

SOIL GROUPS BY AREAS - IN ACRES

Based on Reconnaissance Soil Survey - Charleston County, S. C.

Area No.	SOIL GROUP													Total
	1	2	3	4	5	6	8	9	10	11	12	13	14	
1	6177	2113	36	694	1782	827	18,782		1464			89*	832	32,796
2	974	1016		3502	3302	1207	4659				96			14,756
3	6098	4836	110	7064	10,660	5970	3038			658	894	3963*		43,291
4	12,371	16,169	1904	2088	5797	3609	18,190		3413				1711	65,252
5	5202	13,509	355	3328	6207	7634	33,850		2706	61	1254		584	74,690
6	5654	8458	7493	4387	8445	7776	12,039	574		272				55,098
7	7637	6066	205	1860	3523	2711	9102			35				31,139
8	6718	9762	149	921	5406	1919	28,054		1076				1172	55,177
9	12,593	41,552	14,645	4444	16,233	13,237	10,884			13,372	34			126,994
10	2679	590	520	2589	1919	10,230	1356	2534		172				22,589
11	1490	1679		2253	2214	6281	4348	52		789	111	10,561		29,778
12	1795	2618	1449	5843	14,046	21,270	1868			4351				53,240
Total	69,388	108,368	26,866	38,973	79,534	82,671	146,170	3160	8659	19,710	2389	14,613	4299	604,800

* Includes a total of 551 acres of mine areas.

Lakeland sand, 0 to 6 percent slopes
Ona loamy fine sand
Eustis loamy fine sand, low, shallow, 2 to 6 percent slopes
Eustis loamy fine sand, low, 6 to 10 percent slopes
Eustis loamy fine sand, low, shallow, 6 to 10 percent slopes
Lakeland sand, 6 to 10 percent slopes
Lakeland sand, shallow, 0 to 2 percent slopes
Lakeland sand, shallow, 2 to 6 percent slopes
Lakeland sand, shallow, 6 to 10 percent slopes

Soil Group 2 (Map Symbol 2)

Somewhat Poorly to Poorly Drained Soils with Loamy Fine Sand to Sand Subsoils.

The soils in this group have dark gray to black, sandy surface soils, and grayish brown to gray, sandy subsoils, and occur at intermediate and lower elevations on nearly level relief. They are broadly distributed over the County and extensive in area. The water table is high during wet weather. Internal drainage is rapid when not impeded by the water table. They have a low to high organic matter content, and are low to moderate in natural fertility. They are productive for crops when properly drained and managed. Soils in this group require intensive drainage for any type of development. Ditch bank erosion and channel silting are major hazards.

Soil Group 2 contains the following soils:
Kiawah loamy fine sand
Rutlege loamy fine sand, thick surface
Kiawah loamy sand
Klej loamy fine sand
Scranton loamy sand
Klej loamy sand, terrace

Soil Group 3 (Map Symbol 3)

Poorly Drained and Very Poorly Drained Soils with Sand Subsoils and Organic Hardpan Soils.

The soils in this group have thin, black, sandy surface soils underlain by a gray sand subsoil. They occur on level relief and at lower elevations than surrounding soils. Often they are found along streams and waterways, and in broad, low, flat areas. They are broadly distributed over the County, and are extensive in area. Large areas are found in the northeastern part of the County, and to a lesser extent, in the southwestern part of the County. Two of the soils in this group have an organic hardpan in the subsoil. They are subject to frequent flooding and have a high water table most of the time. Internal drainage is moderate to slow because of the high water table with the hardpan soils having slow internal drainage. Organic matter content is low to high. Fertility is very low. The soils in this group are chiefly in woodland, and are very poorly suited for agriculture, residence, or industry.

The soils in this group are difficult to drain properly. They are unstable, and will present many problems in design and construction.

Soil Group 3 contains the following soils:
Plummer fine sand
St. Johns fine sand
Rutlege loamy fine sand
Rutlege fine sand
Leon fine sand
Plummer loamy sand, terrace

Soil Group 4 (Map Symbol 4)

Well drained and Moderately Well Drained Soils with Sandy Loam to Sandy Clay Loam Subsoils.

The soils in this group have brown to grayish brown loamy fine sand to fine sandy loam surface soils. The subsoils are brown to yellowish brown fine sandy loam to fine sandy clay loam. They occur at intermediate elevations on nearly level relief. A few soils in this group occur on slightly steeper land. These soils are broadly distributed over the County, with the most extensive areas occurring between Charleston and the Edisto River. The water table is often deeper than four feet. A temporary perched water table occurs above the subsoil during wet weather. Internal drainage is moderate to slow. These soils are generally low in organic matter and low to moderate in fertility. The soils are well suited to a wide variety of uses, including agriculture, residence, recreation or industry.

Soils in this group require some drainage to remove surface water, and to lower the temporary, perched water table during wet weather. These soils are sufficiently stable to eliminate many of the design and construction hazards found in unstable soils.

Soil Group 4 contains the following soils:
Eulonia loamy fine sand 0 to 2 percent slopes
Charleston fine sandy loam, 0 to 2 percent slopes
Charleston fine sandy loam, 2 to 6 percent slopes
Eulonia loamy fine sand, thick surface, 0 to 2 percent slopes
Fairhope fine sandy loam, 2 to 6 percent slopes
Eulonia loamy fine sand, 2 to 6 percent slopes
Fairhope fine sandy loam, 0 to 2 percent slopes
Eulonia loamy fine sand, thick surface, 2 to 6 percent slopes
Eulonia loamy fine sand, 2 to 6 percent slopes, eroded
Fairhope loamy sand, thick surface, 2 to 6 percent slopes
Farihope fine sandy loam, 6 to 10 percent slopes
Fairhope fine sandy loam, 2 to 6 percent slopes, eroded
Norfolk fine sandy loam, 0 to 2 percent slopes
Fairhope loamy sand, thick surface, 0 to 2 percent slopes
Norfolk loamy sand, thick surface, 0 to 2 percent slopes
Norfolk fine sandy loam, 2 to 6 percent slopes
Norfolk loamy sand, thick surface, 2 to 6 percent slopes

Soil Group 5 (Map Symbol 5)

Somewhat Poorly Drained to Poorly Drained Soils with Sandy Loam to Sandy Clay Loam Subsoils.

This group includes soils having dark gray, fine sandy loam surface soils and grayish brown to gray fine sandy loam to fine sandy clay loam subsoils. They occupy low positions on nearly level relief. They are extensive in area, with most of the soils occurring in the area between the Wando and Edisto Rivers. The water table is high during wet weather. Internal drainage is moderate to slow. They have a moderate organic matter content and are moderate to low in natural fertility. Some of the most productive soils in the County are in this group.

The soils in this group require intensive drainage to remove excess water from the surface and subsurface, and to lower the water table for most uses. Intensity of use determines the intensity of drainage required. These soils are stable and should not present any major problems in drainage design, construction, and maintenance. When drained they are very good for agriculture and good to fair for residence, industry or recreation.

Soil Group 5 contains the following soils:

- Edisto fine sandy loam
- Weston fine sandy loam
- Lynchburg sandy loam
- Rains fine sandy loam
- Wahee fine sandy loam
- Izagora sandy loam
- Dunbar sandy loam

Soil Group 6 (Map Symbol 6)

Poorly Drained and Very Poorly Drained Soils with Plastic Sandy Clay Loam to Sandy Clay Subsoils.

This group includes soils having black to very dark gray fine sandy loam surface soil and a gray to dark gray, plastic fine sandy clay loam to fine sandy clay subsoil. They occur at low elevations on level relief. They often occur adjacent to streams and drainage ways. Flooding is frequent and internal drainage is slow. The water table is deeper than 3 feet. These soils have a perched water table at or near the surface most of the time. The organic matter content is medium to high and natural fertility is moderate. They are broadly distributed over the County with large acreages lying north of U. S. Highway 17 and between the Ashley and Edisto Rivers.

The soils in this group are difficult to drain because of location and slow internal drainage. However, some soils in this group can be economically drained for agricultural use, but have low potential for residence or industrial use.

Soil Group 6 contains the following soils:

- Bladen fine sandy loam, neutral substratum
- Bayboro loam
- Bayboro clay loam
- Meggett fine sandy loam
- Bayboro fine sandy loam
- Hyde loam
- Meggett loam
- Coxville sandy loam
- Stono fine sandy loam
- Bladen clay loam
- Bladen loam
- Meggett clay loam
- Bladen fine sandy loam
- Hyde clay loam
- Portsmouth fine sandy loam
- Portsmouth loam

Soil Group 7 (Map Symbol 7)

Poorly Drained and Very Poorly Drained Alluvial and Terrace Soils with Sandy Clay to Silty Clay Subsoils

The soils in this group have dark brown to dark gray silty clay loam to sandy loam surface soils, and gray sandy clay to silty clay subsoils. They occur on level relief, mostly along the Santee River. Flooding is frequent, and water stands on the surface much of the time. The water table is deeper than 3 feet. The present use is principally woodland. Some cleared areas, formerly used for rice production, have been developed for duck hunting. Soils in this group are very difficult to drain because of the flooding hazard and slow internal drainage.

Areas of this soil group are found on the Santee River bottoms but now are flooded by tidal waters. They have been mapped as Tidal Marsh, Group 8.

Soil Group 7 contains the following soils:

- Chewacla-Wehadkee silty clay loams
- Leaf fine sandy loam
- Myatt sandy loam

Soil Group 8 (Map Symbol 8)

Tidal Marsh

The soils in this group have a black to gray, clayey surface soil and a dark gray to gray, clayey subsoil and are flooded by tide water. They occur on the lowest elevations in the County between the high and low tide levels on level relief, and include those areas covered by less frequent high tides. The water table is always high, and internal drainage is very slow. The soils in this group are broadly distributed in large acreages over the County. The organic matter content is low to medium, and fertility is low because of salt and sulphur in the soils. These soils cannot be used for woodland or agriculture because when drained, an extremely acid condition results, which kills all vegetation. Some areas can be developed for wildlife purposes. Other areas are suitable as sites for salt water ponds or flood water storage areas. They are unsuited for residential or industrial sites.

Soil Group 8 contains the following soils:

- Tidal Marsh, soft acid clays
- Tidal Marsh, firm acid clays
- Tidal Marsh, soft acid mucks and peats
- Tidal Marsh, firm acid mucks and peats

Soil Group 9 (Map Symbol 9)

Fresh Water Marsh

The soils in this group usually have a thin to thick organic surface soil overlying mineral soil material that ranges from sand to clay. These soils are very poorly drained, are flooded continuously, and have slow internal drainage. They occur along upper reaches of the rivers and in inland areas and are not extensive in area. At one time, some areas of these soils were used for growing rice.

Soil Group 9 contains the following soils:
- Muck and peat, shallow
- Fresh Water Marsh, firm clays
- Fresh Water Marsh, firm mucks and peats
- Fresh Water Marsh, soft

Soil Group 10 (Map Symbol 10)

Duneland

The soils in this group are deep loose sands, with ridge and trough relief, occurring on long, narrow islands in the tidal marshes. A vegetative cover of trees, shrubs, and grasses covers these soils. The ridge sands are well drained and have a low water table and very rapid internal drainage. The trough sands are poorly drained and have a high water table and slow internal drainage during wet weather. Duneland occurs at low elevations, usually not over 10 feet above mean sea level, and can be subject to flooding by hurricane tides. Organic matter content and natural fertility are very low. If the ridges and troughs are leveled they have some potential for residential and recreational uses. Hurricane high tides are a hazard.

Stabilized duneland is the only soil in Soil Group 10.

Soil Group 11 (Map Symbol 11)

Swamp

The soils in this group usually have a black surface soil, high in organic matter, and a gray subsoil ranging from sand to clay. They are level and occupy positions along streams and drainways. Flooding is frequent and a high water table and standing water are present most of the year. Drainage is very difficult and seldom feasible. The best use is woodland.

Soil Group 12 (Map Symbol 12)

Made Land

The soil materials in this group vary from sand to clay. They include materials that have been dug from marsh areas and deposited nearby. They also include low areas that have had fill material placed on them to raise the ground level. They occur in small areas broadly distributed over the County. The water table and internal drainage are variable in these soils. Organic matter content and fertility are very low. On-site investigation is necessary to determine suitable uses for this group of soils.

Soil Group 12 contains the following soils:
- Sandy made land
- Made land, clayey substratum

Soil Group 13 (Map Symbol 13)

Mined Areas - Phosphate

Most of this area occurring between the Ashley River and Rantowles Creek, was extensively mined years ago for the underlying phosphate rock. The relief varies from level, to ridges and troughs. The low, level areas have slow internal drainage and a high water table. The soils are generally fine sandy loams to fine sandy clay loam in texture on the level areas and sandy loam to sandy clay loam in the ridges and trough areas. Drainage is very difficult because of the topography. The present, and most suitable use, is woodland.

Soil Group 14 (Map Symbol 14)

Coastal Beach

This group includes the beach area that is flooded daily by the tide, and also the sand dunes back of the beaches. The dune areas are deep, loose, drouthy sands, constantly being shifted by the wind and occasionally eroded by water. They are very low in fertility and organic matter. Coastal Beach occupies long narrow areas along the ocean shoreline of Charleston County. Drainage is not a problem on the dune sands. Their present use is for recreation and as beach house sites. Hurricanes and storms cause wind and water hazards.

Factors Considered in Preparation of Plan

The Drainage Feasibility Study was prepared by Engineers of the Soil Conservation Service with the assistance of Engineers of the Charleston County Public Works Department. On-site investigations were made of the outlets for each Main Canal, and the factors affecting drainage within the watershed such as tidal ranges, river stages, flooding, and the time of year in which flooding occurs, were studied.

The reconnaissance soil survey of the County, prepared by Soil Scientists of the Soil Conservation Service, was used to determine the extent of the land needing drainage, and the soil characteristics which affect drainage design and construction.

The backlog of engineering information available through the Charleston Work Unit Office of the Soil Conservation Service and the Charleston County Public Works Department was also used, particularly that pertaining to drainage investigations.

U. S. Geological Survey Topographic Maps were used to determine the general topography within each watershed and to assist in delineation of watersheds. A limited amount of instrument surveying was made to secure detailed information in critical areas.

Uncontrolled aerial photos, scale 1" = 1,000', which were flown in 1961, were used in recording field data and for preparation of the drainage plan.

Agencies and commercial concerns, having knowledge of specific drainage problems, were consulted in making the final decisions in certain areas. Maps, surveys, and plans available from these agencies were also used.

In most instances, mains were located along natural drainage ways with modifications in alignment to improve the flow and the collection of water. All needed laterals within the watersheds were not located since the purpose of the study is to locate and design only the main canals which will furnish the means for disposal of runoff from all parts of the watershed. All mains are terminated in tidal creeks or natural outlets at a point where they have adequate capacity and depth.

No attempt was made to locate underground utilities such as cables, gas pipe lines, water mains, and conduits. However, due consideration must be given to the location of these underground utilities during the preparation of the final plans.

In some instances, main canals were planned to pass through existing farm ponds in order to maintain required depth and grades. In preparing the final plans, it will be necessary to eliminate or by-pass these sites. In general, the drainage plan was limited to areas considered as "high lands", that is, five feet or more above mean low water. Drainage plans were not prepared for areas of "high land" such as Sullivans Island, Isle of Palms, and Folly Beach, which have good local drainage.

The drainage plans were confined to the County and do not include proposed drainage installations within the limits of the old City of Charleston.

Watersheds draining into the County from adjoining Counties were determined for the purpose of designing main canals. The mains, however, are shown beginning at the County line. Due attention was given to possible land use changes which would affect runoff within the portion of these watersheds in adjacent Counties.

Engineering Considerations

Engineering considerations for planning, design, construction, maintenance and other matters pertinent to the Main Drainage Canals Feasibility Study are listed below:

Design

1. The plan presented herewith is a Feasibility Study to estimate the cost and the extent of needed main drainage facilities and the physical practicability of drainage in the county. Detailed Engineering surveys and designs will be required before any part of the proposed plan is constructed. All improvements should be made continuous, beginning at the lower or outlet end of the watershed.

2. Plans and designs contained in this report do not include a complete study of underground storm sewers found in Areas 2 and 3, due to the fact that these are not considered as mains. Also, there is a lack of information on original surveys and designs showing size, depth and location. Detailed studies will be needed to determine the present condition of these storm sewers and their additional needs.

3. Culverts at rail and road crossings were designed to satisfy the minimum requirements based on expected flow. Increases in size of these structures may be desirable to provide an added safety factor for passing run-off in excess of designed flow; especially, where presently unforeseen improvements are made in the vicinity.

4. In designing the drainage system, anticipated future land use was considered in determining channel sizes. This future use was based on projections prepared by the Charleston County Planning Board.

5. The South Carolina Wildlife Resources Department will be consulted when fish and wildlife may be affected by the construction of main drainage canals.

Acquisitions of Rights-of-way

The means for, and the acquisition of adequate rights-of-way for the installation of main canals is absolutely essential. The right-of-way must be adequate to take care of width requirements for spoil management, channel section, berm, and access. (See Figure 2)

Maintenance of Channels

A well organized and adequately financed maintenance program is essential to maintain design capacity in all canals. Provision for annual maintenance or periodic reconstruction to maintain the effectiveness of the channel must be considered prior to construction. The failure of many drainage enterprises to function as designed can be directly attributed to an inadequate maintenance program. Maintenance of the designed depth of channels is one of the most important items in a maintenance program. The cost of maintenance may be reduced considerably if provision is made in channel designs for easy access, stabilization of side slopes and other silt-contributing areas such as road fills and road drainage immediately following construction. Provision should also be made for maintenance of pumps, conduits, tide gates and dikes, so that these installations may be completely operable at all times.

Obstructions

Construction of fences, walks, and other structures that may retard channel flow should not be permitted except as approved by the responsible agency of the County Government. Other structures such as culverts, bridge piers, trestles, etc., should be designed so as to cause minimum interference with the channel flow. Dumping trash, garbage, and other debris in channels should be prohibited.

Definition of Terms

Brief descriptions of terms used in this report are listed below in alphabetical order.

Available Water Capacity - The available water capacity is expressed in inches per inch of soil depth, and is an approximation of the capillary water in the soil when wet to field capacity.

cfs - Abbreviation for cubic feet per second; a unit of water flow - sometimes called "second feet".

Dispersion - The degree and rapidity with which soil structure breaks down or slakes in water. High dispersion means that the soil slakes readily.

Engineering Soil Classification Systems

AASHO - The American Association of State Highway Officials has developed a classification based on the field performance of soils. In this classification, soils are placed in seven groups designated as: A-1, A-2, A-3, A-4, A-5, A-6, and A-7. Some of the groups are divided into subgroups. The soils in each group are evaluated by means of a group index, a number that takes into account the behavior of soil and soil materials in embankments, subgrades, and subbases. The essentials of the classification are shown in Table 2, which also describes, for each class, some characteristics of the material. Most highway engineers classify soil in accordance with this system.

Unified Soil Classification System - A soil classification system in which the soil materials are identified as coarse grained (8 classes) fine grained (6 classes), or highly organic. Some characteristics of these classes of soil are given in Table 2.

Horizon, Soil - A layer of the soil approximately parallel to the surface soil and having well defined characteristics, but different in appearance and characteristics from the layers above and below it.

Internal Drainage - The movement of water through the soil profile. The rate is affected by the texture of the surface soil and subsoil and by the height of the water table. A wet, deep sand may have slow internal drainage when the water table is high and rapid internal drainage when the water table is low. A plastic sandy clay soil may have slow internal drainage regardless of water table height.

Infiltration - Rainfall minus interception, evaporation, and surface runoff. The part of rainfall that enters the soil.

Lateral Ditch - A major ditch in a drainage system which serves as a link between the main ditch and the collection system located in a segment of the watershed.

Main Canal - (Ditch or Channel) - The principal channel which conducts the drainage water from the watershed to the outlet.

Organic Hardpan - A compacted soil layer containing finely divided humus and sand.

Perched Water Table - A temporary water table above a slowly permeable substratum at a relatively shallow depth.

Permeability Rate - The rate of movement of water through the soil.

Profile, Soil - A vertical section of the soil through all its horizons and extending into the parent material.

Reaction, Soil - The degree of acidity or alkalinity of a soil expressed in pH values. A soil that tests to pH 7.0 is precisely neutral in reaction, because it is neither acid nor alkaline. In words the degrees of acidity or alkalinity are expressed thus:

	pH
Extremely acid- - - - -	Below 4.5
Very strongly acid- - -	4.5 to 5.0
Strongly acid - - - - -	5.1 to 5.5
Medium acid - - - - - -	5.6 to 6.0
Slightly acid - - - - -	6.1 to 6.5
Neutral - - - - - - - -	6.6 to 7.3
Mildly alkaline - - - -	7.4 to 7.8
Moderately alkaline - -	7.9 to 8.4
Strongly alkaline - - -	8.5 to 9.0
Very strongly alkaline-	9.1 and higher

Reach - A length of channel selected for use in hydraulic computations.

Relief - The elevations or inequalities of a land surface, considered collectively.

Runoff, Surface - Total rainfall minus interception, infiltration, and surface storage, and which moves across the ground to a stream or depression.

Runoff, Subsurface - Water that infiltrates the soil and reappears as seepage or spring flow.

Shrink-Swell Potential - Indicates the volume change to be expected of the soil material with changes in moisture content.

Surface, Soil - The soil ordinarily moved in tillage or its equivalent in uncultivated soil about 6 to 10 inches in thickness - a part of the A horizon.

Terrace (Geological) - An old alluvial plain, ordinarily flat or undulating, bordering a river, lake, or the sea. Stream terraces are frequently called second bottoms, as contrasted to flood plains, and are seldom subject to overflow. Marine terraces were deposited by the sea and are generally wide.

Texture, Soil - The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportions of fine particles are as follows: sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay, and clay. The sand, loamy sand, and sandy loam classes may be further divided by specifying "coarse", "fine", or "very fine".

Tide Data

Mean Range - Difference between mean high water and mean low water.

Spring Range - The average range which occurs semi-monthly as a result of the moon being full or new.

Mean Tide Level - (Half tide level) - is a plane midway between mean low water and mean high water.

High Water - The maximum height reached by each rising tide.

Watershed - An area of land from which all water that falls within the area, converges toward and discharges past a designated point.

TABLE 4
SUMMARY OF DATA AND ESTIMATED COST
DIKES - TIDE GATES AND PUMPS

Area No.	Pump Site No.	Main Canal No.	Dike Length - Ft.	Pumps No.	Pumps Capacity - Ea. - GPM	Estimated Total Cost
1	A	2	600	2	22,000	$ 44,100.00
1	B	9	400	2	20,000	38,200.00
2	C	1	500	2	9,000	32,800.00
2	D	2	400	2	9,000	31,700.00
2	E	3	500	2	24,000	43,000.00
2	F	6	400	3	34,000	57,700.00
2	G	12	400	2	28,000	44,600.00
3	H	27	500	2	16,000	38,400.00
3	I	11 & 12	800	2	28,000	48,900.00
3	J	16	300	2	15,000	36,300.00
3	K	14	300	2	11,000	30,700.00
3	L	6	400	2	12,000	32,200.00
6	M	14	700	3	30,000	46,700.00
Grand Total						$ 525,300.00

TABLE NO. 5
SUMMARY OF ENGINEERING AND DESIGN DATA BY AREAS

AREA NO.	LENGTH CANALS AND LATERALS FT.	EXCAVATION CU. YDS.	RIGHT-OF-WAY CLEARING AC.	DIKE AND PUMP INSTALLATIONS NO.	ESTIMATED TOTAL COST
1	84,100	133,887	48.8	2	$ 78,764
2	106,300	155,747	45.8	5	131,041
3	294,300	570,512	171.7	5	356,326
4	370,000	1,020,690	318.2	-	505,692
5	244,500	417,484	153.3	-	226,640
6	429,600	937,065	364.7	1	480,084
7	173,600	336,292	110.6	-	171,928
8	191,500	308,808	99.3	-	161,811
9	616,300	1,062,879	492.5	-	552,696
10	135,100	323,790	129.4	-	163,048
11	90,200	141,404	60.4	-	86,017
12	328,700	967,791	375.7	-	431,483
COUNTY TOTALS	3,064,200	6,376,349	2,370.4	13	3,345,530

Technical References

C. E. Ramser - FLOW OF WATER IN DRAINAGE CHANNELS - U. S. Department of Agriculture - Technical Bulletin No. 129 - U. S. Government Printing Office - Washington, D. C.

H. W. King - HANDBOOK OF HYDRAULICS - McGraw-Hill Book Co., Inc., New York, N. Y.

War Department, Corps of Engineers - HYDRAULIC TABLES - U. S. Government Printing Office - Washington, D. C.

U. S. Department of Agriculture, Soil Conservation Service - NATIONAL ENGINEERING HANDBOOK - DRAINAGE - Section 16, Chapters 1, 2, 3, 4, 5, 6.

U. S. Department of Agriculture, Soil Conservation Service - NATIONAL ENGINEERING HANDBOOK - HYDRAULICS - Section 5.

U. S. Department of Agriculture, Soil Conservation Service - FIELD DRAINAGE GUIDE FOR SOUTH CAROLINA.

U. S. Department of Commerce, Weather Bureau - TECHNICAL PAPER NO. 4 - RAINFALL, FREQUENCY ATLAS OF THE UNITED STATES - U. S. Government Printing Office - Washington, D. C.

U. S. Department of Agriculture, Soil Conservation Service - NATIONAL ENGINEFRING HANDBOOK - HYDROLOGY - Section 4.

Authority and Acknowledgement

Authorization for preparation of the Feasibility Study of Requirements for Main Drainage Canals for Charleston County is the result of a cooperative agreement entered into on September 5, 1961, by:

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Charleston Soil Conservation District - T. Wilbur Thornhill, Acting Chairman

Soil Conservation Service - T. S. Buie, State Conservationist

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U. S. Corp of Army Engineers
U. S. Navy - Public Works Department
Charleston County Board of Assessors

Thomas E. Thornhill, *President, Charleston Chamber of Commerce*

Charles M. Gibson - *Member, Charleston County Legislative Delegation*

Cartography and Printing – Spartanburg Cartographic Unit, Soil Conservation Service

Explanation of Engineering Data Tables

The following Engineering Data Tables contain information, by Areas, for each main canal and laterals by watersheds.

An explanation of each column in the Engineering Data sheets is as follows:

Column 1 CANAL NUMBER
Numbering of main canals begins with M-1 and laterals with L-1, in each Area. Where main canals cross Area boundaries, the numbering system changes and the total data for the main canal in this case can be determined by referring to the appropriate tables for the Area in which the main canal is located.

Column 2 LENGTH IN FEET
The stationing of all mains and laterals begins at the upper end (headwaters) and continues toward the outlet. The mains and laterals are shown in reaches or section in the data tables for design purposes. Each reach, or section, reflects a change in water concentration resulting from the entrance of lateral drainage.

Column 3 WATERSHED IN ACRES
See Definition of Terms

Column 4 DISCHARGE - CUBIC FEET PER SECOND
From appropriate drainage coefficient curves dependant on the land use.

Column 5 TOP WIDTH IN FEET
Self explanatory

Column 6 BOTTOM WIDTH IN FEET
Self explanatory

Column 7 AVERAGE DEPTH IN FEET
Self explanatory

Column 8 EXCAVATION IN CUBIC YARDS
Self explanatory

Column 9 RIGHT OF WAY CLEARING IN ACRES
Self explanatory

Column 10 REQUIRED RIGHT OF WAY WIDTH IN FEET
Based on minimum requirements needed for channel cross section, spoil management, berm width, and access road for maintenance equipment.

Column 11 CULVERTS, LOWERING - LENGTH & SIZE
Refers to the existing in-place culverts which are to be re-used.

Column 12 CULVERTS AND BRIDGES - NEW - LENGTH & SIZE
Refers to additional culverts, bridges or trestles required to handle design discharge. Design of culverts is based on round concrete pipe.

Column 13 TOTAL ESTIMATED COST IN DOLLARS
Total costs shown include only the estimated construction costs and do not include engineering costs and the cost of acquiring required right-of-way. When preparing the final cost estimates these engineering costs and right-of-way costs should be included in the total cost of the project. Total estimated costs as shown are based on the following unit prices prevailing in Charleston County in 1962.

EXCAVATION
Rural Area - High Ground - - $0.25 per cu. yd.
Urban Areas - - - - - - - - 0.35 per cu. yd.
Marsh - - - - - - - - - - - 0.50 per cu. yd.

DIKE EMBANKMENT MATERIAL
In Place - - - - - - - - - - $1.00 per cu. yd.

RIGHT-OF-WAY CLEARING & GRUBBING
Rural Areas - - - - - - - $350.00 per acre
Urban Areas - - - - - - - 500.00 per acre

LOWERING EXISTING CULVERTS
Labor and equipment costs only.

NEW CULVERT AND CONDUIT COSTS
Based on present cost of circular concrete pipe.

BRIDGES
Based on present costs of precast R/C prevailing in the county.

TRESTLES
Based on present costs of wooden, pressure-treated creosote trestles prevailing in the county.

ENGINEERING AND DESIGN DATA

Area 1 - James Island

CANAL No. (1)	LENGTH Ft. (2)	WATERSHED Ac. (3)	DISCHARGE c.f.s. (4)	CHANNEL DIMENSIONS TOP WIDTH Ft. (5)	BOTTOM WIDTH Ft. (6)	AVERAGE DEPTH Ft. (7)	EXCAVATION Cu. Yds. (8)	RT. OF WAY CLEARING Ac. (9)	REQUIRED RT. OF WAY WIDTH Ft. (10)	CULVERTS LOWERING Length & Size (11)	CULVERTS & BRIDGES - NEW Length & Size (12)	TOTAL ESTIMATED COST Dollars (13)
M-1	4700	260	56	14.2	3.0	5.6	8366	4.2	45	--	130' - 36"	
M-1	6900	810	141	17.2	6.0	5.6	16,629	4.2	53	100' - 48"	--	
Total-1	11,600						24,995	8.4				13,706.00
M-2	2200	156	36	14.2	3.0	5.6	2937	1.0	45	50' - 36"	--	
M-2	2900	225	49	14.2	3.0	5.6	3871	2.6	45	50' - 48"	--	
M-2	2300	483	93	14.0	6.0	4.0	2553	--	39	--	--	
Total-2	7400						9361	3.6				5,108.00
M-3	5200	460	89	16.8	4.0	6.4	9672	3.6	51	40' - 36"	--	
										40' - 24"	--	
M-3	2800	598	112	20.0	4.0	8.0	7476	1.3	64	50' - 36"	--	
										--	50' - 30"	
Total-3	8000						17,148	4.9				7,478.00
M-4	5400	244	53	15.0	3.0	6.0	8100	2.5	52	--	20' - 30"	
										50' - 36"	--	
										--	40' - 36"	
Total-4	5400						8100	2.5				5,014.00
M-5	3700	147	35	13.0	3.0	5.0	4380	1.4	38	--	20' - 15"	
										40' - 15"	--	
										40' - 36"	--	
Total-5	3700						4380	1.4				2,604.00
M-6	2500	100	25	13.8	3.0	5.4	3131	1.1	42	--	--	
M-6	1200	138	33	11.0	3.0	4.0	936	--	32	--	50' - 36"	
Total-6	3700						4067	1.1				2,336.00
M-7	4900	290	61	17.2	4.0	6.6	10,152	5.4	54	--	60' - 36"	
M-7	600	330	69	16.0	4.0	6.0	1066	0.4	45	--	--	
Total-7	5500						11,218	5.8				5,674.00
M-8	2500	155	36	14.0	3.0	5.6	3560	2.1	43	--	40' - 36"	
M-8	3200	275	58	15.2	4.0	5.6	5120	2.9	45		30' - 42"	
Total-8	5700						8680	5.0				5,264.00
M-9	3700	310	64	14.4	4.0	5.2	6586	3.1	43	40' - 30"	--	
										--	40' - 42"	
M-9	3600	439	87	16.6	6.0	4.8	6077	1.7	49	--	40' - 54"	
Total-9	7300						12,663	4.8				8,181.00
M-10	3300	257	55	15.2	3.0	5.6	6600	1.5	45	--	40' - 48"	
Total-10	3300						6600	1.5				3,007.00
M-11	3000	115	28	13.0	3.0	5.0	3330	0.7	38	--	50' - 30"	
Total-11	3000						3330	0.7				2,025.00
M-12	3100	156	36	13.0	3.0	5.0	4588	2.2	38	--	180' - 42"	
										--	24' - 30"	
M-12	4300	275	59	13.2	4.0	4.6	5091	1.9	39	120' - 30"	--	
Total-12	7400						9679	4.1				9,623.00
M-13	1000	143	34	13.0	3.0	5.0	1480	1.8	38	40' - 30"	--	
										--	40' - 24"	
M-13	6500	356	73	14.0	6.0	4.0	7696		39	--	--	
Total-13	7500						9176	1.8				5,614.00

ENGINEERING AND DESIGN DATA

Area 1 - James Island

CANAL	LENGTH	WATERSHED	DISCHARGE	CHANNEL DIMENSIONS			EXCAVATION	RT. OF WAY CLEARING	REQUIRED RT. OF WAY WIDTH	CULVERTS LOWERING	CULVERTS & BRIDGES - NEW	TOTAL ESTIMATED COST
No. (1)	Ft. (2)	Ac. (3)	c.f.s. (4)	TOP WIDTH Ft. (5)	BOTTOM WIDTH Ft. (6)	AVERAGE DEPTH Ft. (7)	Cu. Yds. (8)	Ac. (9)	Ft. (10)	Length & Size (11)	Length & Size (12)	Dollars (13)
M-14	4600	136	33	11.8	3.0	4.4	4490	3.2	36	--	40' - 30"	
Total-14	4600						4490	3.2				3,130.00
Area 1 Grand Total	84,100						133,887	48.80				78,764.00

ENGINEERING AND DESIGN DATA

Area 2 - St. Andrews

CANAL No. (1)	LENGTH Ft. (2)	WATERSHED Ac. (3)	DISCHARGE c.f.s. (4)	CHANNEL DIMENSIONS: TOP WIDTH Ft. (5)	CHANNEL DIMENSIONS: BOTTOM WIDTH Ft. (6)	CHANNEL DIMENSIONS: AVERAGE DEPTH Ft. (7)	EXCAVATION Cu. Yds. (8)	RT. OF WAY CLEARING Ac. (9)	REQUIRED RT. OF WAY WIDTH Ft. (10)	CULVERTS LOWERING Length & Size (11)	CULVERTS & BRIDGES - NEW Length & Size (12)	TOTAL ESTIMATED COST Dollars (13)
M-1	3600	168	39	12.0	4.0	4.0	4284	--	35	80' - 30"		
Total-1	3600						4284					2,550.00
M-2	2600	153	36	11.0	3.0	4.0	2704	--	32	40' - 48"		
Total-2	2600						2704					1,768.00
M-3	1700	55	16	13.0	3.0	5.0	2516	1.2	38	--	--	
L-1	1100	23	8	13.0	3.0	5.0	1628	0.8	38	--	--	
M-3	1600	180	41	12.2	3.0	4.6	2080	0.7	36	--	100' - 42"	
										--	60' - 48"	
M-3	4300	380	77	16.8	6.0	5.4	7912	0.9	48	--	250' - 54"	
										--	400' - 60"	
M-3	3800	546	104	18.0	10.0	4.0	7866	--	44	--	50' - 48"	
Total-3	12,500						22,002	3.6				31,963.00
M-4	3100	214	47	14.0	4.0	5.0	5177	1.2	41	--	50' - 24"	
										--	50' - 30"	
										--	140' - 36"	
M-4	3400	396	79	18.2	5.0	6.6	7752	1.7	56			
Total-4	6500						12,929	2.9				8,810.00
M-5	1200	60	15	13.0	3.0	5.0	1776	0.7	38	--	--	
Total-5	1200						1776	0.7				971.00
M-6	5100	428	85	15.0	5.0	5.0	7548	4.4	44	--	50' - 30"	
										--	90' - 42"	
M-6	2200	670	123	16.0	6.0	5.0	3590	2.0	46	--	--	
M-6	5100	1190	198	18.0	8.0	5.0	9833	3.7	52	--	--	
M-6	3800	1390	226	18.8	8.0	5.4	10,146	--	56	--	--	
L-1	3400	214	47	14.0	6.0	4.0	5032	2.6	39	--	--	
L-2	4500	154	36	13.0	3.0	5.0	6660	3.3	38	--	192' - 42"	
L-3	3200	150	35	13.0	3.0	5.0	4736	1.5	38	--	160' - 30"	
										--	150' - 36"	
L-4	1800	159	38	13.0	3.0	5.0	2131	1.3	38	100' - 36"	--	
L-5	2200	115	28	12.2	3.0	4.6	2288	1.5	35	40' - 18"	--	
L-6	2500	106	27	13.0	3.0	5.0	2960	1.8	38	--	40' - 18"	
										--	80' - 30"	
										40' - 24"	--	
L-7	2000	100	26	13.0	3.0	5.0	2960	0.9	38	40' - 18"	--	
										--	40' - 18"	
										--	70' - 30"	
										--	160' - 36"	
Total-6	35,800						57,884	23.0				47,429.00
M-7	1600	58	16	11.0	3.0	4.0	1664	1.0	32	--	40' - 30"	
M-7	4400	276	59	14.0	6.0	4.0	5210	3.3	39	--	--	
Total-7	6000						6874	4.3				4,964.00
M-8	2000	191	44	14.8	4.0	5.4	3780	1.7	44	--	40' - 36"	
M-8	2400	322	67	14.6	5.0	4.8	3341	1.2	44	--	--	
Total-8	4400						7121	2.9				4,703.00

ENGINEERING AND DESIGN DATA

Area 2 - St. Andrews

CANAL	LENGTH	WATERSHED	DISCHARGE	CHANNEL DIMENSIONS			EXCAVATION	RT. OF WAY CLEARING	REQUIRED RT. OF WAY WIDTH	CULVERTS LOWERING	CULVERTS & BRIDGES - NEW	TOTAL ESTIMATED COST
				TOP WIDTH	BOTTOM WIDTH	AVERAGE DEPTH						
No. (1)	Ft. (2)	Ac. (3)	c.f.s. (4)	Ft. (5)	Ft. (6)	Ft. (7)	Cu. Yds. (8)	Ac. (9)	Ft. (10)	Length & Size (11)	Length & Size (12)	Dollars (13)
M-9	2800	108	27	10.2	3.0	4.0	2330	0.5	35	--	--	
Total-9	2800						2330	0.5				1,065.00
M-10	4200	253	55	13.0	5.0	4.0	4468	1.1	37	--	130' - 48"	
Total-10	4200						4468	1.1				4,818.00
M-11	900	380	77	14.0	6.0	4.0	1332	0.4	39	--	--	
Total-11	900						1332	0.4				866.00
M-12	3000	104	24	11.0	3.0	4.0	2496	1.4	32	--	--	
M-12	2100	656	122	16.0	8.0	4.0	2990	--	44	--	--	
L-1	3600	172	40	12.0	4.0	4.0	3427	1.0	35	--	--	
Total-12	8700						8913	2.4				5,282.00
M-13	3700	386	77	14.0	6.0	4.0	4381	1.2	39	--	50' - 36"	
M-13	3800	560	106	16.0	8.0	4.0	6764	--	42	--	--	
Total-13	7500						11,145	1.2				6,215.00
M-14	2800	271	58	13.0	5.0	4.0	3724	0.8	34		140' - 30"	
											80' - 36"	
M-14	2100	402	81	14.2	5.0	4.6	2738	0.4	37	--	--	
Total-14	4900						6462	1.2				5,820.00
M-15	900	90	23	13.0	3.0	5.0	1332	0.5	38	--	40' - 30"	
										40' - 30"	--	
M-15	700	90		(Storm drain - 700' of 24" in place - detailed study required to determine grade, depth and size)								
M-15	800	206	46	12.2	3.0	4.6	1040	0.6	38	--	--	
M-15	2300	257	55	12.8	4.0	4.4	3151	0.5	38	--	--	
Total-15	4700						5523	1.6				3,817.00
Area 2 Grand Total	106,300						155,747	45.8				131,041.00

ENGINEERING AND DESIGN DATA

Area 3 - North Charleston - Ladson

CANAL No. (1)	LENGTH Ft. (2)	WATERSHED Ac. (3)	DISCHARGE c.f.s. (4)	CHANNEL DIMENSIONS TOP WIDTH Ft. (5)	BOTTOM WIDTH Ft. (6)	AVERAGE DEPTH Ft. (7)	EXCAVATION Cu. Yds. (8)	RT. OF WAY CLEARING Ac. (9)	REQUIRED RT. OF WAY WIDTH Ft. (10)	CULVERTS LOWERING Length & Size (11)	CULVERTS & BRIDGES - NEW Length & Size (12)	TOTAL ESTIMATED COST Dollars (13)
M-1	1200	62	17	13.0	3.0	5.0	1776	0.4	38	--	--	
M-1	1900	129	31	11.0	3.0	4.0	2184	0.6	32	--	--	
Total-1	3100						3960	1.0				2,213.00
M-2	3300	106	27	11.8	3.0	4.4	4026	1.0	35	--	30' - 24"	
Total-2	3300						4026	1.0				2,732.00
M-3	2300	99	24	11.2	3.0	4.6	2990	0.7	36	--	--	
Total-3	2300						2990	0.7				1,845.00
M-4	1700	87	23	11.4	3.0	4.2	1887	0.5	35	--	--	
Total-4	1700						1887	0.5				1,193.00
M-5	2300	127	31	12.0	4.0	4.0	2737	0.7	35	--	--	
M-5	4800	181	43	13.0	5.0	4.0	6384	--	37	--	--	
L-1	800	30	(800 ft. storm drain - detailed surveys required to determine grade, depth and size)									
L-1	1900	54	15	9.0	3.0	3.0	1273	--	27	--	100' - 24"	
Total-5	9800						10,394	0.7				6,277.00
M-6	3900	80	(3900 ft. storm drain in place - 18" to 36" - detailed surveys required to determine depth, grade and size)									
M-6	2500	222	49	13.0	5.0	4.0	3325	--	41	--	--	
M-6	2100	222+	(2100 ft. storm drain across naval base - detailed surveys required to determine grade, depth and size)									
Total-6	8500						3325	--				1,662.00
M-7	300	4	2	Present ditch adequate					27	--	--	
M-7	2800	122	(2800 ft. storm drain in place - detailed surveys required to determine grade, depth and size)									
Total-7	3100						--	--				--
M-6	400	6	3	Present ditch adequate					27	--	--	
M-8	2500	56	(2500 ft. storm drain in place - detailed surveys required to determine grade, depth and size)									
Total-8	2900						--	--				--
M-9	1800	40	(1800 ft. storm drain in place - detailed surveys required to determine grade, depth and size)									
M-9	1900	130	31	13.2	4.0	4.6	2812	--	39	--	--	
L-1	1600	46	(1600 ft. existing storm drain - detailed surveys required to determine grade, depth and size)									
Total-9	5300						2812	--				1,406.00
M-10	1000	83	22	11.0	3.0	4.0	1040	Pipe culvert under I-26 Hwy.	32	130' - 30"	--	
M-10	900	161	37	12.0	4.0	4.0	1071	Pipe culvert under 4 rail-road lines	35		160' - 30"	
M-10	1500	199	(1500 ft. existing storm drain ranging from 18" to 36" in size)									
M-10	2500	257	55	15.0	5.0	5.0	4625	1.7	44	--	--	
Total-10	5900						6736	1.7				6,196.00
M-11	1500	115	29	11.0	3.0	4.0	1560	0.5	32	130' - 36"	--	
										--	80' - 30"	
M-11	1300	169	39	13.0	3.0	5.0	2072	0.7	38		120' - 36"	
										80' - 30"	--	
M-11	900	208	47	11.4	3.0	4.2	999	0.6	34	--	--	
M-11	1000	226	49	12.0	4.0	4.0	1190	--	34	--	--	
Total-11	4700						5821	1.8				11,086.00

ENGINEERING AND DESIGN DATA

Area 3 - North Charleston - Ladson

CANAL No. (1)	LENGTH Ft. (2)	WATERSHED Ac. (3)	DISCHARGE c.f.s. (4)	CHANNEL DIMENSIONS TOP WIDTH Ft. (5)	BOTTOM WIDTH Ft. (6)	AVERAGE DEPTH Ft. (7)	EXCAVATION Cu. Yds. (8)	RT. OF WAY CLEARING Ac. (9)	REQUIRED RT. OF WAY WIDTH Ft. (10)	CULVERTS LOWERING Length & Size (11)	CULVERTS & BRIDGES - NEW Length & Size (12)	TOTAL ESTIMATED COST Dollars (13)
M-12	500	154	36	Existing ditch adequate					41	--	60' - 42"	
M-12	1200	269	58	14.0	4.0	5.0	1603	0.6	41	--	40' - 42"	
											280' - 54"	
M-12	1000	330	69	14.0	4.0	4.0	1190	0.8	41		50' - 54"	
M-12	1100	371	75	13.0	5.0	4.0	1463	--	37	--	--	
Total-12	3800						4256	1.4				11,844.00
M-13	800	85	13	This section of existing ditch is adequate					32	--	--	
M-13	500	90	24	Existing 24" storm drain					32			
M-13	700	120	30	Existing open ditch section is adequate					32	--	--	
M-13	1600	148	35	12.0	4.0	4.0	1904	0.5	35	50' - 48"	--	
Total-13	3600						1904	0.5				1,722.00
M-14	800	74	20	11.0	3.0	4.0	832	--	32	--	60' - 30"	
M-14	600	135	32	11.0	3.0	4.0	624	0.4	32	--	200' - 42"	
M-14	2300	202	46	13.2	4.0	4.6	3404	--	39	80' - 30"	--	
Total-14	3700						4860	0.4				7,010.00
M-15	1100	58	16	12.2	3.0	4.6	1144	--	36	60' - 36"	--	
										--	60' - 30"	
M-15	400	173	40	12.2	3.0	4.6	416	0.3	36	--	50' - 42"	
M-15	1100	188	43	14.0	4.0	5.0	1837	0.6	41	--	50' - 42"	
Total-15	2600						3397	0.9				4,626.00
M-16	1900	83	22	Clean out existing ditch					36	--	--	
M-16	4200	283	59	(4200 ft. existing storm drain ranging from 24" to 36")								
M-16	1900	298	63	14.0	6.0	4.0	2812	--	33	--	50' - 54"	
Total-16	8000						2812	--				2,581.00
M-17	Present canal adequate from upper end to Goodrich Road								41	--	--	
M-17	3500	235	52	14.0	4.0	5.0	4676	2.4	41	--	50' - 54"	
Total-17	3500						4676	2.4				4,011.00
M-18	2000	2497	363	26.0	14.0	6.0	8880	3.3	78			
M-18	1400	3083	432	52.0	40.0	6.0	14,308	4.9	159			
M-18	2000	3355	461	55.0	45.0	5.0	18,580	2.7	153			
M-18	1300	3651	495	58.0	50.0	4.0	10,400	--	155			
M-18	3400	4248	563	58.0	50.0	4.0	27,200	--	155			
M-18	1600	4523	594	64.0	55.0	4.5	15,872	--	168			
M-18	2400	4908	637	70.0	60.0	5.0	28,896	--	193			
Total-18	14,100						124,136	10.9				76,056.00
M-19	1900	156	36	12.2	3.0	4.6	2470	0.4	37	80' - 24"		
Total-19	1900						2470	0.4				1,727.00
M-20	2400	85	22	12.2	3.0	4.6	3120	0.7	37	50' - 18"	--	
M-20	800	292	62	15.0	5.0	5.0	1480	--	44	--	--	
L-1	2100	138	33	12.2	3.0	4.6	2730	--	37	--	--	
Total-20	5300						7330	0.7				4,130.00
M-21	2200	177	41	14.0	4.0	5.0	3674	0.4	41	50' - 36"	--	
Total-21	2200						3674	0.4				2,387.00

ENGINEERING AND DESIGN DATA

Area 3 - North Charleston - Ladson

CANAL No. (1)	LENGTH Ft. (2)	WATERSHED Ac. (3)	DISCHARGE c.f.s. (4)	CHANNEL DIMENSIONS TOP WIDTH Ft. (5)	BOTTOM WIDTH Ft. (6)	AVERAGE DEPTH Ft. (7)	EXCAVATION Cu. Yds. (8)	RT. OF WAY CLEARING Ac. (9)	REQUIRED RT. OF WAY WIDTH Ft. (10)	CULVERTS LOWERING Length & Size (11)	CULVERTS & BRIDGES - NEW Length & Size (12)	TOTAL ESTIMATED COST Dollars (13)
M-22	1100	41	11	13.0	3.0	5.0	1628	0.8	38	--	120' - 24"	
M-22	2500	92	23	13.0	3.0	5.0	3700	0.4	38	--	--	
Total-22	3600						5328	1.2				4,140.00
M-23	1300	121	30	12.0	4.0	4.0	1547	0.5	35	--	120' - 24"	
										300' - 24"	--	
M-23	1000	151	36	12.0	4.0	4.0	1190	--	35	--	--	
L-1	800	20	6	12.2	3.0	4.6	1040	--	35	--	40' - 18"	
Total-23	3100						3777	0.5				4,293.00
M-24	300	21	6	(300 ft.existing 18" storm drain alongside old Meeting St.Road)					41	--	160' - 24"	
M-24	2200	113	30	14.0	4.0	5.0	2939	--	41	80' - 24"	--	
										270' - 36"	--	
M-24	1100	151	36	13.2	4.0	4.6	1628	0.6	41	--	--	
Total-24	3600						4567	0.6				5,933.00
M-25	1200	106	26	11.0	3.0	4.0	1248	0.7	32	--	--	
Total-25	1200						1248	0.7				974.00
M-26	3100	182	41	14.0	4.0	5.0	5177	0.5	41	--	--	
Total-26	3100						5177	0.5				2,838.00
M-27	2900	80	22	13.0	3.0	5.0	4292	1.5	38	--	120' - 24"	
M-27	1000	154	36	13.0	3.0	5.0	1480	0.7	38	--	60' - 48"	
M-27	600	205	46	16.0	6.0	5.0	1224	0.5	48	--	--	
M-27	1400	352	71	Existing ditch adequate					57	--	--	
M-27	1500	502	95	19.2	10.0	4.6	3720	--	56	--	--	
M-27	1900	585	109	19.2	10.0	4.6	4712	--	56	--	--	
Total-27	9300						15,428	2.7				10,138.00
M-28	1000	62	18	Existing ditch adequate					38	--	--	
M-28	400	92	23	(400 ft. existing 42" storm drain)					38			
M-28	1000	92	23	11.0	3.0	4.0	1040	0.4	32	--	--	
M-28	450	100	26	(450 ft.existing storm drain-double line is adequate)					38	--	--	
M-28	650	113	29	13.2	4.0	4.6	577	--	41	--	--	
Total-28	3500						1617	0.4				852.00
M-29	700	53	15	13.0	3.0	5.0	1036	0.5	38	40' - 36"	--	
										40' - 30"	--	
M-29	1300	120	30	13.0	3.0	5.0	1924	1.0	38	140' - 30"	--	
Total-29	2000						2960	1.5				3,428.00
M-30	2900	529	100	16.0	6.0	5.0	5916	2.3	46	--	50' - 54"	
Total-30	2900						5916	2.3				5,283.00
M-31	4500	430	85	16.0	6.0	5.0	9180	4.1	46	--	60' - 60"	
M-31	3200	552	106	17.2	8.0	4.6	6880	1.0	50	--	--	
Total-31	7700						16,060	5.1				10,001.00
M-32	3400	598	111	18.0	8.0	5.0	8194	3.1	46	--	15' R/C Bridge	
M-32	2800	851	149	20.0	10.0	5.0	7784	3.2	57	--	--	
M-32	1500	1341	218	25.2	16.0	5.0	5835	2.3	73	--	--	
M-32	5400	2314	338	34.0	24.0	5.0	28,998	10.9	94	--	--	
M-32	3600	2505	363	36.0	26.0	5.0	20,664	2.1	99	--	--	
L-1	5000	345	69	14.0	4.0	5.0	8350	4.0	41	--	--	
L-2	3200	145	33	13.0	3.0	5.0	4736	2.4	38	--	--	
Total-32	24,900						84,561	28.0				37,981.00

ENGINEERING AND DESIGN DATA

Area 3 - North Charleston - Ladson

CANAL No. (1)	LENGTH Ft. (2)	WATERSHED Ac. (3)	DISCHARGE c.f.s. (4)	CHANNEL DIMENSIONS TOP WIDTH Ft. (5)	CHANNEL DIMENSIONS BOTTOM WIDTH Ft. (6)	CHANNEL DIMENSIONS AVERAGE DEPTH Ft. (7)	EXCAVATION Cu. Yds. (8)	RT. OF WAY CLEARING Ac. (9)	REQUIRED RT. OF WAY WIDTH Ft. (10)	CULVERTS LOWERING Length & Size (11)	CULVERTS & BRIDGES - NEW Length & Size (12)	TOTAL ESTIMATED COST Dollars (13)
M-33	2100	225	49	Existing canal is adequate					41	--	40' - 24"	
M-33	2500	381	78	Existing canal is adequate					55	--	--	
M-33	1600	685	107	Existing canal is adequate					55	--	--	
M-33	4300	984	166	22.0	12.0	5.0	13,545	5.5	62	--	--	
L-1	2700	161	37	13.0	3.0	5.0	3996	2.0	38	--	80' - 42"	
Total-33	13,200						17,541	7.5				8,646.00
M-34	3600	375	77	13.0	3.0	5.0	5328	2.6	38	--	80' - 60"	
M-34	3000	692	126	15.0	5.0	5.0	5560	2.1	44	--	40' - 48"	
M-34	3200	892	156	17.0	7.0	5.0	7104	3.2	49	--	--	
Total-34	9800						17,992	7.9				10,383.00
M-35	2100	177	41	13.0	3.0	5.0	3108	1.1	38	--	40' - 48"	
M-35	2800	520	98	14.0	4.0	5.0	4676	2.2	41	--	--	
Total-35	4900						7784	3.3				5,206.00
M-36	4500	220	49	13.0	3.0	5.0	6660	3.3	38	--	40' - 42"	
M-36	1000	294	62	13.0	3.0	5.0	1480	0.7	38	--	200' - 60"	
M-36	2300	503	97	13.0	3.0	5.0	3404	1.7	38	--	--	
Total-36	7800						11,544	5.7				11,273.00
M-37	3000	218	48	13.0	3.0	5.0	4440	2.2	38	--	--	
M-37	4200	655	120	15.0	5.0	5.0	7770	3.7	44	--	--	
M-37	3300	816	143	16.0	6.0	5.0	6732	3.0	48	--	15' R/C Bridge	
Total-37	10,500						18,942	8.9				9,725.00
M-38	2000	161	37	13.0	3.0	5.0	2960	1.5	38	--	70' - 48"	
M-38	3100	285	60	13.0	3.0	5.0	4588	2.3	38	--	--	
M-38	1000	674	123	16.0	6.0	5.0	2040	0.9	48	--	--	
M-38	2000	1019	173	19.0	9.0	5.0	5180	2.2	55	--	--	
M-38	2000	1039	176	24.0	14.0	5.0	7040	2.8	68	--	--	
L-1	1800	92	23	13.0	3.0	5.0	2664	1.3	38	--	50' - 36"	
L-1	1200	154	36	13.0	3.0	5.0	1776	0.9	38	--	--	
L-2	2100	136	32	13.0	3.0	5.0	3108	1.5	38	--	--	
L-2	2900	292	61	14.0	4.0	5.0	4843	2.3	41	--	--	
L-3	2400	133	32	13.0	3.0	5.0	3552	1.8	38	--	90' - 42"	
L-3	1400	186	43	13.0	3.0	5.0	2072	1.0	38	--	--	
Total-38	21,900						39,823	18.5				20,098.00
M-39	1800	110	27	13.0	3.0	5.0	2664	0.8	38	40' - 48"	--	
M-39	900	156	36	13.0	3.0	5.0	1332	0.7	38	--	--	
M-39	1200	806	142	17.0	7.0	5.0	2664	1.2	49	--	15' R/C Bridge	
M-39	5200	1167	193	19.0	9.0	5.0	13,468	5.8	55	--	--	
M-39	1000	1534	240	22.0	12.0	5.0	3150	1.3	62	--	--	
L-1	3000	220	49	13.0	3.0	5.0	4440	2.3	38	--	--	
L-1	3100	342	75	13.0	3.0	5.0	4588	2.3	38	--	--	
L-2	2700	294	62	13.0	3.0	5.0	3996	2.0	38	--	--	
L-2	3600	616	113	15.0	5.0	5.0	7030	3.3	44	--	--	
L-3	1600	108	27	13.0	3.0	5.0	2368	1.2	38	--	80' - 42"	
L-3	2100	184	42	13.0	3.0	5.0	3108	1.5	38	--	--	
Total-39	26,400						48,808	22.4				23,641.00

Area 3 - North Charleston - Ladson

CANAL No. (1)	LENGTH Ft. (2)	WATERSHED Ac. (3)	DISCHARGE c.f.s. (4)	CHANNEL DIMENSIONS TOP WIDTH Ft. (5)	BOTTOM WIDTH Ft. (6)	AVERAGE DEPTH Ft. (7)	EXCAVATION Cu. Yds. (8)	RT. OF WAY CLEARING Ac. (9)	REQUIRED RT. OF WAY WIDTH Ft. (10)	CULVERTS LOWERING Length & Size (11)	CULVERTS & BRIDGES - NEW Length & Size (12)	TOTAL ESTIMATED COST Dollars (13)
M-40	1300	76	20	13.0	3.0	5.0	1924	1.0	38	--	50' - 36"	
M-40	2500	193	44	13.0	3.0	5.0	3700	1.8	38	--	--	
Total-40	3800						5624	2.8				3,086.00
M-41	2500	163	39	13.0	3.0	5.0	3700	1.8	38	--	50' - 48"	
M-41	2500	250	54	13.0	3.0	5.0	3700	1.8	38	32' - 54"	--	
Total-41	5000						7400	3.6				4,526.00
M-42	3700	248	54	13.0	3.0	5.0	5476	2.7	38	--	50' - 54"	
M-42	2600	386	77	15.0	5.0	5.0	4810	2.3	44	--	--	
Total-42	6300						10,286	5.0				5,496.00
M-43	500	138	33	13.0	3.0	5.0	740	0.4	38	--	40' - 48"	
M-43	4200	301	63	13.0	3.0	5.0	6216	3.1	38	--	--	
M-43	2900	593	111	15.0	5.0	5.0	5365	2.5	44	--	--	
M-43	2000	1616	253	22.0	12.0	5.0	6300	2.6	62	--	--	
L-1	1700	154	36	13.0	3.0	5.0	2516	1.2	38	--	40' - 48"	
L-1	1900	218	48	13.0	3.0	5.0	2812	1.4	38	--	--	
L-1	900	460	89	14.0	4.0	5.0	1503	0.7	41	--	--	
L-1	1300	492	95	15.0	5.0	5.0	2405	1.1	44	--	--	
L-1	1700	805	142	17.0	7.0	5.0	3774	1.7	49	--	--	
L-2	3400	205	46	13.0	3.0	5.0	5032	2.5	38	--	40' - 48"	
Total-43	20,500						36,663	17.2				17,681.00
M-44		Main canal excavated and maintained by U. S. Air Force is adequate										
M-45		Main canal excavated and maintained by U. S. Air Force is adequate										
M-46		Main canal excavated and maintained by U. S. Air Force is adequate										
Area 3 Grand Total	294,300						570,512	171.7				356,326.00

ENGINEERING AND DESIGN DATA

Area 4 - Johns Island

CANAL No. (1)	LENGTH Ft. (2)	WATERSHED Ac. (3)	DISCHARGE c.f.s. (4)	CHANNEL DIMENSIONS: TOP WIDTH Ft. (5)	CHANNEL DIMENSIONS: BOTTOM WIDTH Ft. (6)	CHANNEL DIMENSIONS: AVERAGE DEPTH Ft. (7)	EXCAVATION Cu. Yds. (8)	RT. OF WAY CLEARING Ac. (9)	REQUIRED RT. OF WAY WIDTH Ft. (10)	CULVERTS LOWERING Length & Size (11)	CULVERTS & BRIDGES - NEW Length & Size (12)	TOTAL ESTIMATED COST Dollars (13)
M-1	2100	115	29	13.0	3.0	5.0	3108	1.5	38	--	40' - 42"	
M-1	4400	460	90	15.0	5.0	5.0	8140	3.8	44	--	--	
M-1	900	465	90	16.0	6.0	5.0	1836	0.4	46	--	--	
M-1	1200	965	165	22.0	12.0	5.0	3780	0.8	62	--	--	
L-1	4900	500	95	16.0	6.0	5.0	9996	4.0	44	--	40' - 60"	
Total-1	13,500						26,860	10.5				13,601.00
M-2	3500	322	66	16.0	6.0	5.0	7140	3.2	46	--	50' - 60"	
M-2	7500	1058	183	24.0	14.0	5.0	26,400	10.7	68		15' Bridge	
M-2	3000	1311	210	24.0	14.0	5.0	10,560	2.1	68	--	--	
Total-2	14,000						44,100	16.0				22,570.00
M-3	5000	414	82	20.8	12.0	4.4	13,350	5.7	56	--	--	
M-3	7700	1012	174	32.8	24.0	4.4	35,651	14.3	87	--	--	
M-3	400	1660	259	48.8	40.0	4.4	2888	1.1	126		30' Bridge	
M-3	1400	3000	422	68.8	60.0	4.4	14,672	5.4	175	--	--	
M-3	1000	3020	425	68.8	60.0	4.4	10,480	3.9	175		45' Bridge	
M-3	5300	3468	475	78.8	70.0	4.4	64,183	--	200	--	--	
M-3	1300	3620	492	78.8	70.0	4.4	15,743	--	200	--	--	
L-1	4600	356	73	16.0	8.0	4.0	8188	4.0	44	--	--	
L-1	5800	648	119	22.0	14.0	4.0	15,486	7.0	58	--	--	
L-2	1300	278	46	12.0	4.0	4.0	1443	0.9	35	--	50' - 60"	
L-2	3700	1160	194	30.0	22.0	4.0	14,245	6.0	77	--	--	
L-2	3100	1340	218	32.0	24.0	4.0	12,865	5.4	82	--	--	
L-3	2000	237	52	14.0	4.0	5.0	3340	1.6	47		40' - 66"	
L-3	1600	437	86	18.0	8.0	5.0	3856	1.7	52	--	--	
L-4	4500	253	56	16.0	6.0	5.0	9180	--	46	--	--	
Total-3	48,700						225,570	57.0				111,625.00
M-4	4300	269	57	15.0	5.0	5.0	7955	3.8	44	--	--	
M-4	3700	430	84	17.0	7.0	5.0	8214	3.7	47	--	40' - 66"	
M-4	4600	540	102	19.0	9.0	5.0	11,914	3.5	55	--	--	
Total-4	12,600						28,083	11.0				12,326.00
M-5	3200	154	36	13.0	3.0	5.0	4736	2.4	38	--	40' - 48"	
M-5	1200	195	43	14.0	4.0	5.0	2004	1.0	41	--	--	
M-5	3500	531	101	19.0	9.0	5.0	9065	3.9	55	--	--	
M-5	4000	750	136	22.0	12.0	5.0	12,600	5.1	62	--	15' Bridge	
M-5	3000	1286	208	30.0	20.0	5.0	13,890	5.4	84	--	--	
M-5	5600	1603	250	34.0	24.0	5.0	30,072	7.1	94	--	--	
M-5	1700	2030	304	40.0	30.0	5.0	11,016	--	110	--	--	
L-1	3400	212	48	13.0	3.0	5.0	5032	2.5	38	--	40' - 54"	
L-1	1500	249	55	14.0	4.0	5.0	2505	1.2	41	--	--	
L-2	1300	133	32	12.2	3.0	4.6	1690	1.0	38	--	--	
L-2	3500	253	56	13.2	4.0	4.6	5180	2.8	41	--	40' - 54"	
L-2	3400	460	88	16.2	7.0	4.6	7174	3.6	52	--	--	
L-3	4200	225	49	13.0	3.0	5.0	6216	3.1	38	--	--	
L-3	4500	427	85	17.0	7.0	5.0	9990	3.5	47	--	--	
Total-5	44,000						121,170	42.6				60,060.00

ENGINEERING AND DESIGN DATA

Area 4 - Johns Island

CANAL No. (1)	LENGTH Ft. (2)	WATERSHED Ac. (3)	DISCHARGE c.f.s. (4)	CHANNEL DIMENSIONS TOP WIDTH Ft. (5)	BOTTOM WIDTH Ft. (6)	AVERAGE DEPTH Ft. (7)	EXCAVATION Cu. Yds. (8)	RT. OF WAY CLEARING Ac. (9)	REQUIRED RT. OF WAY WIDTH Ft. (10)	CULVERTS LOWERING Length & Size (11)	CULVERTS & BRIDGES - NEW Length & Size (12)	TOTAL ESTIMATED COST Dollars (13)
M-6	5700	425	83	17.0	7.0	5.0	12,654	5.6	47	--	--	
M-6	2300	551	103	20.0	10.0	5.0	6394	2.7	57	--	--	
M-6	3900	1364	219	32.0	22.0	5.0	19,500	7.4	89		30' Bridge	
M-6	1900	1801	275	38.0	28.0	5.0	11,609	4.3	105		30' Bridge	
M-6	4600	2143	318	42.0	32.0	5.0	31,510	3.8	116	--	--	
L-1	6100	386	77	15.0	5.0	5.0	11,285	5.3	44	--	30' - 42"	
L-2	1900	241	53	13.0	3.0	5.0	2812	1.4	38	--	--	
L-2	2100	666	122	18.0	8.0	5.0	9640	2.2	52	--	--	
L-3	2600	356	73	15.0	5.0	5.0	4810	2.3	44	--	--	
Total-6	31,100						110,214	35.0				54,185.00
M-7	2900	71	19	13.0	3.0	5.0	4292	2.1	38	--	--	
M-7	1600	466	91	17.0	7.0	5.0	3552	1.6	47	--	--	
M-7	1000	581	109	18.0	8.0	5.0	2410	1.1	52	--	15' Bridge	
M-7	1600	591	110	18.0	8.0	5.0	3856	1.1	52	--	--	
M-7	2000	2190	325	32.0	22.0	5.0	10,000	--	89	--	--	
L-1	2300	177	41	13.0	3.0	5.0	3404	1.7	38	--	--	
L-1	1600	343	70	15.0	5.0	5.0	2960	1.4	44	--	--	
L-2	3200	90	23	13.0	3.0	5.0	4736	2.4	38	--	40' - 36"	
L-3	3000	115	29	13.0	3.0	5.0	4440	2.2	38		40' - 36"	
											40' - 42"	
Total-7	19,200						39,650	13.6				21,803.00
M-8	3000	437	86	16.0	6.0	5.0	6120	2.8	46	--	--	
M-8	2700	759	136	19.0	9.0	5.0	6993	3.0	55	--	--	
M-8	2100	1092	185	22.0	12.0	5.0	6615	2.7	62	--	--	
M-8	3100	1285	209	26.0	16.0	5.0	12,059	4.8	73	--	--	
M-8	1600	1599	250	28.0	18.0	5.0	6816	--	78			
L-1	2700	92	23	13.0	3.0	5.0	3996	2.0	38	--	40' - 36"	
L-2	4600	264	57	13.0	3.0	5.0	6808	3.4	38	--	--	
Total-8	19,800						49,407	18.7				23,035.00
M-9	3000	239	54	13.0	3.0	5.0	4440	2.2	38	--	--	
M-9	3300	379	76	15.0	5.0	5.0	6105	2.9	44	--	15' Bridge	
M-9	1600	494	94	16.0	6.0	5.0	3264	1.5	46	--	--	
M-9	2700	683	124	18.0	8.0	5.0	6507	2.9	52	--	15' Bridge	
M-9	4300	786	141	19.0	9.0	5.0	11,137	--	55	--	--	
L-1	1600	113	29	13.0	3.0	5.0	2368	1.2	38	--	40' - 42"	
Total-9	16,500						33,821	10.7				19,406.00
M-10	4100	214	46	13.0	3.0	5.0	6068	3.0	38	--	40' - 48"	
M-10	2400	329	68	13.0	3.0	5.0	3552	0.7	38	--	--	
Total-10	6,500						9620	3.7				5,420.00
M-11	3400	192	34	13.0	3.0	5.0	5032	2.5	38	--	80' - 42"	
M-11	4100	391	59	14.0	4.0	5.0	6847	3.3	41	--	--	
M-11	2700	1099	143	20.0	10.0	5.0	7506	--	57	--	15' Bridge	
M-11	4100	1253	161	22.0	12.0	5.0	12,915	--	62	--	--	
L-1	4600	363	59	13.0	3.0	5.0	6808	3.4	38	--	40' - 60"	
L-1	4400	745	103	17.0	7.0	5.0	9768	4.3	49	--	--	
L-1	3000	993	132	19.0	9.0	5.0	7770	3.4	55	--	--	
L-2	2300	76	16	13.0	3.0	5.0	3404	1.7	38	--	--	
Total-11	28,600						60,050	18.6				30,990.00

ENGINEERING AND DESIGN DATA

Area 4 - Johns Island

CANAL No. (1)	LENGTH Ft. (2)	WATERSHED Ac. (3)	DISCHARGE c.f.s. (4)	CHANNEL DIMENSIONS TOP WIDTH Ft. (5)	BOTTOM WIDTH Ft. (6)	AVERAGE DEPTH Ft. (7)	EXCAVATION Cu. Yds. (8)	RT. OF WAY CLEARING Ac. (9)	REQUIRED RT. OF WAY WIDTH Ft. (10)	CULVERTS LOWERING Length & Size (11)	CULVERTS & BRIDGES - NEW Length & Size (12)	TOTAL ESTIMATED COST Dollars (13)
M-12	4600	281	46	15.4	3.0	6.2	9706	4.3	47	--	--	
M-12	4700	520	77	22.0	6.0	8.0	19,505	7.0	71	--	--	
M-12	3000	1394	174	34.0	14.0	10.0	26,670	8.3	126	--	--	
M-12	2900	2067	245	34.0	20.0	7.0	20,300	6.9	109	--	30' Bridge	
M-12	1400	2092	252	30.0	20.0	5.0	6482	1.4	84	--	--	
L-1	3500	469	71	15.0	5.0	5.0	6475	3.1	44	--	--	
L-1	3500	759	106	17.0	7.0	5.0	7770	3.9	55	--	--	
L-2	3500	264	44	13.0	3.0	5.0	5180	2.6	38	--	--	
L-2	3200	443	67	13.0	3.0	5.0	4736	2.4	38	--	--	
Total-12	30,300						106,824	39.9				45,291.00
M-13	5300	529	78	16.0	6.0	5.0	10,812	4.9	46	--	--	
M-13	5400	938	126	18.0	8.0	5.0	13,014	5.7	52	--	15' Bridge	
M-13	3600	1308	165	22.0	12.0	5.0	11,340	2.1	62	--	--	
Total-13	14,300						35,166	12.7				16,361.00
M-14	3700	328	52	12.8	4.0	4.4	5069	2.8	39	--	--	
M-14	2900	634	89	17.0	7.0	5.0	6438	2.9	49	--	15' Bridge	
M-14	2300	758	104	18.0	8.0	5.0	5553	1.1	52	--	--	
M-14	2200	850	114	18.0	8.0	5.0	5302	--	53	--	--	
Total-14	11,100						22,362	6.8				12,559.00
M-15	1400	62	14	13.0	3.0	5.0	2072	0.6	38	--	--	
M-15	3800	202	36	13.0	3.0	5.0	5624	1.7	38	40' - 30"	--	
M-15	500	342	54	14.0	4.0	5.0	835	--	41	--	--	
L-1	3200	140	26	13.0	3.0	5.0	4736	0.7	38	--	--	
Total-15	8,900						13,267	3.0				7,369.00
M-16	4000	304	48	13.0	5.0	4.0	5320	2.8	37	--	--	
M-16	4000	612	88	18.8	10.0	4.4	9320	1.1	53	--	--	
M-16	4000	840	114	20.8	12.0	4.4	10,680	--	58	--	--	
M-16	2400	1047	138	24.8	16.0	4.4	7992	--	67	--	--	
Total-16	14,400						33,312	3.9				16,691.00
M-17	4200	731	51	14.0	6.0	4.0	6216	3.2	39	--	--	
M-17	3500	986	68	16.2	7.0	4.6	6860	3.2	46	--	15' Bridge	
M-17	3800	1407	86	18.2	9.0	4.6	8854	--	51	--	--	
M-17	3700	1602	95	20.0	10.0	5.0	10,286	--	57	--	--	
L-1	3500	253	21	11.0	3.0	4.0	3640	2.1	32	--	--	
L-1	3400	437	33	12.0	4.0	4.0	4046	2.3	35	--	40' - 60"	
Total-17	22,100						39,902	10.8				21,559.00
M-18	3000	230	19	13.0	3.0	5.0	4440	2.2	38	--	--	
M-18	3400	483	36	13.0	3.0	5.0	5032	--	38	--	--	
Total-18	6,400						9,472	2.2				4,396.00
M-19	4000	366	29	13.0	3.0	5.0	5920	--	38	--	--	
M-19	4000	660	46	13.0	3.0	5.0	5920	1.5	38	--	--	
Total-19	8,000						11,840	1.5				6,445.00
Area 4 Grand Total	370,000						1,020,690	318.2				505,692.00

ENGINEERING AND DESIGN DATA

Area 5 - Mt. Pleasant - Awendaw

CANAL No. (1)	LENGTH Ft. (2)	WATERSHED Ac. (3)	DISCHARGE c.f.s. (4)	CHANNEL DIMENSIONS			EXCAVATION Cu. Yds. (8)	RT. OF WAY CLEARING Ac. (9)	REQUIRED RT. OF WAY WIDTH Ft. (10)	CULVERTS LOWERING Length & Size (11)	CULVERTS & BRIDGES - NEW Length & Size (12)	TOTAL ESTIMATED COST Dollars (13)
				TOP WIDTH Ft. (5)	BOTTOM WIDTH Ft. (6)	AVERAGE DEPTH Ft. (7)						
M-1	4500	271	22	13.0	3.0	5.0	6660	3.3	38	--	30' - 54"	
M-1	4300	329	26	13.0	3.0	5.0	6364	1.8	38	--	30' - 60"	
Total-1	8800						13,024	5.1				7,354.00
M-2	1000	55	5	13.0	3.0	5.0	1480	0.7	38	--	40' - 30"	
M-2	6500	552	40	13.0	3.0	5.0	9620	4.8	38	--	15' Bridge	
Total-2	7500						11,100	5.5				6,983.00
M-3	2700	209	36	13.0	3.0	5.0	3996	2.0	38	--	20' - 42"	
M-3	5200	409	61	15.0	5.0	5.0	9620	3.5	44	--	--	
Total-3	7900						13,616	5.5				6,320.00
M-4	8200	441	66	15.0	5.0	5.0	15,168	6.3	44	--	--	
Total-4	8200						15,168	6.3				5,997.00
M-5	8000	575	41	13.0	3.0	5.0	11,840	5.8	38	--	80' - 54"	
M-5	1300	672	47	13.0	3.0	5.0	1924	1.0	38	--	40' - 66"	
M-5	4100	1596	97	18.0	8.0	5.0	9880	--	52	--	--	
L-1	4800	409	31	13.0	3.0	5.0	7104	3.5	38	--	40' - 42"	
L-1	4500	650	46	13.0	3.0	5.0	6660	3.3	38	--	15' Bridge	
L-1	2400	724	50	13.0	3.0	5.0	3552	1.8	38	--	15' Bridge	
Total-5	25,100						40,960	15.4				25,858.00
M-6	7200	598	9	13.0	3.0	5.0	10,656	5.3	38	--	80' - 60"	
Total-6	7200						10,656	5.3				6,807.00
M-7	9400	828	11	13.0	3.0	5.0	13,912	4.4	38	--	--	
Total-7	9400						13,912	4.4				5,018.00
M-8	5600	228	19	13.0	3.0	5.0	8288	2.9	38	--	40' - 42" 40' - 48"	
M-8	2200	251	20	13.0	3.0	5.0	3256	--	38	100' - 36"	100' - 30"	
Total-8	7800						11,544	2.9				7,125.00
M-9	3300	83	8	13.0	3.0	5.0	4884	2.4	38	--	60' - 36"	
Total-9	3300						4884	2.4				2,901.00
M-10	5700	350	27	13.0	3.0	5.0	8436	4.2	38	--	--	
M-10	600	930	61	15.0	5.0	5.0	1110	--	46	--	--	
L-1	4000	568	41	13.0	3.0	5.0	5920	2.9	38	--	--	
Total-10	10,300						15,466	7.1				6,629.00
M-11	3400	172	30	13.0	3.0	5.0	5032	2.5	38	--	40' - 48"	
M-11	5300	333	52	13.0	3.0	5.0	7844	3.9	38	--	--	
M-11	4300	999	131	20.0	10.0	5.0	11,952	5.0	57	--	15' Bridge	
M-11	3300	1618	197	26.0	16.0	5.0	12,836	--	72	--	--	
M-11	600	2039	239	30.0	20.0	5.0	2776	--	83	--	--	
L-1	2200	126	24	13.0	3.0	5.0	3256	1.6	38	--	40' - 42"	
L-1	7100	395	61	14.0	4.0	5.0	11,856	5.7	41	--	--	
L-2	4500	322	50	13.0	3.0	5.0	6660	3.3	38	--	--	
L-3	3500	101	19	13.0	3.0	5.0	5180	2.6	38	--	40' - 30" 40' - 42"	
L-3	5000	411	62	14.0	4.0	5.0	8348	2.0	41	--	40' - 48"	
Total-11	39,200						75,740	26.6				37,439.00

ENGINEERING AND DESIGN DATA

Area 5 - Mt. Pleasant - Awendaw

CANAL No. (1)	LENGTH Ft. (2)	WATERSHED Ac. (3)	DISCHARGE c.f.s. (4)	CHANNEL DIMENSIONS TOP WIDTH Ft. (5)	CHANNEL DIMENSIONS BOTTOM WIDTH Ft. (6)	CHANNEL DIMENSIONS AVERAGE DEPTH Ft. (7)	EXCAVATION Cu. Yds. (8)	RT. OF WAY CLEARING Ac. (9)	REQUIRED RT. OF WAY WIDTH Ft. (10)	CULVERTS LOWERING Length & Size (11)	CULVERTS & BRIDGES - NEW Length & Size (12)	TOTAL ESTIMATED COST Dollars (13)
M-12	6100	327	51	13.0	3.0	5.0	9028	4.5	38	40' - 24"	40' - 60"	
M-12	3500	580	84	17.0	7.0	5.0	7772	3.5	49	--	15' Bridge	
M-12	3300	677	97	17.0	7.0	5.0	7324	--	49	--	--	
Total-12	12,900						24,124	8.0				13,827.00
M-13	7200	621	87	16.0	6.0	5.0	14,688	6.6	46	--	15' Bridge	
M-13	4900	759	105	18.0	8.0	5.0	11,808	5.2	52	--	15' Bridge	
M-13	1000	759	105	18.0	8.0	5.0	2410	--	52	--	--	
Total-13	13,100						28,906	11.8				15,709.00
M-14	2700	124	22	13.0	3.0	5.0	3996	2.0	38	--	40' - 42"	
M-14	4600	313	50	13.0	3.0	5.0	6808	2.1	38	--	70' - 48"	
M-14	1100	323	50	13.0	3.0	5.0	1628	--	38	--	--	
Total-14	8400						12,432	4.1				7,078.00
M-15	2500	81	16	13.0	3.0	5.0	3700	1.8	38	--	--	
M-15	3100	277	44	13.0	3.0	5.0	4588	2.3	38	--	50' - 60"	
M-15	3900	654	102	18.0	8.0	5.0	9400	--	52	--	--	
L-1	3500	187	32	13.0	3.0	5.0	5180	2.6	38	--	--	
L-2	5300	537	78	16.0	6.0	5.0	10,812	4.9	46	--	--	
Total-15	18,300						33,680	11.6				16,260.00
M-16	3800	200	33	13.0	3.0	5.0	5624	2.8	38	--	30' - 42"	
M-16	2100	363	56	13.0	3.0	5.0	3108	1.5	38	--	30' - 54"	
M-16	3800	878	118	19.0	9.0	5.0	9840	--	55	--	--	
L-1	6200	246	40	13.0	3.0	5.0	9176	4.6	38	--	60' - 42"	
											50' - 54"	
L-1	1800	308	49	13.0	3.0	5.0	2664	1.3	38	--	50' - 54"	
Total-16	17,700						30,412	10.2				18,200.00
M-17	2300	124	29	13.0	3.0	5.0	3404	1.1	38	--	120' - 36"	
M-17	1200	165	38	13.0	3.0	5.0	1776	0.9	38	--	40' - 42"	
M-17	800	353	72	16.0	6.0	5.0	1632	0.7	46	--	110' - 30"	
M-17	2600	484	93	17.0	7.0	5.0	5772	2.0	49	--	120' - 54"	
L-1	3300	170	39	13.0	3.0	5.0	4884	2.4	38	--	80' - 48"	
Total-17	10,200						17,468	7.1				14,810.00
M-18	3000	92	23	13.0	3.0	5.0	4440	1.1	38	80' - 24"	--	
Total-18	3000						4440	1.1				2,396.00
M-19	1600	53	14	13.0	3.0	5.0	2368	0.7	38	--	40' - 24"	
M-19	3200	136	32	13.0	3.0	5.0	4736	1.5	38	--	40' - 42"	
Total-19	4800						7104	2.2				4,551.00
M-20	1800	124	29	13.0	3.0	5.0	2664	1.3	38	--	30' - 24"	
M-20	2100	349	72	16.0	6.0	5.0	4284	--	46	--	--	
L-1	2300	156	36	13.0	3.0	5.0	3404	1.7	38	--	--	
Total-20	6200						10,352	3.0				4,928.00

ENGINEERING AND DESIGN DATA

Area 5 - Mt. Pleasant - Awendaw

CANAL No. (1)	LENGTH Ft. (2)	WATERSHED Ac. (3)	DISCHARGE c.f.s. (4)	CHANNEL DIMENSIONS TOP WIDTH Ft. (5)	BOTTOM WIDTH Ft. (6)	AVERAGE DEPTH Ft. (7)	EXCAVATION Cu. Yds. (8)	RT. OF WAY CLEARING Ac. (9)	REQUIRED RT. OF WAY WIDTH Ft. (10)	CULVERTS LOWERING Length & Size (11)	CULVERTS & BRIDGES - NEW Length & Size (12)	TOTAL ESTIMATED COST Dollars (13)
M-21	2300	53	14	13.0	3.0	5.0	3404	1.7	38	--	40' - 30"	
M-21	3200	145	35	13.0	3.0	5.0	4736	1.5	38	--	40' - 36"	
Total-21	5500						8140	3.2				4,623.00
M-22	3400	78	20	13.0	3.0	5.0	5032	2.2	38	--	--	
Total-22	3400						5032	2.2				2,028.00
M-23	5100	260	43	13.0	3.0	5.0	7548	2.3	38	--	30' - 24"	
M-23	1200	260	43	13.0	3.0	5.0	1776	--	38	--	--	
Total-23	6300						9324	2.3				3,799.00
Area 5 Grand Total	244,500						417,484	153.3				226,640.00

ENGINEERING AND DESIGN DATA

Area 6 - Meggett - Hollywood

CANAL No. (1)	LENGTH Ft. (2)	WATERSHED Ac. (3)	DISCHARGE c.f.s. (4)	CHANNEL DIMENSIONS TOP WIDTH Ft. (5)	BOTTOM WIDTH Ft. (6)	AVERAGE DEPTH Ft. (7)	EXCAVATION Cu. Yds. (8)	RT. OF WAY CLEARING Ac. (9)	REQUIRED RT. OF WAY WIDTH Ft. (10)	CULVERTS LOWERING Length & Size (11)	CULVERTS & BRIDGES - NEW Length & Size (12)	TOTAL ESTIMATED COST Dollars (13)
M-1	3000	517	38	13.0	3.0	5.0	4440	2.2	38		50' - 48"	
M-1	4000	747	51	13.0	3.0	5.0	5920	2.9	38	--	--	
M-1	4500	1067	69	16.0	6.0	5.0	9180	4.1	46	--	--	
M-1	3400	1205	77	16.0	6.0	5.0	6936	3.1	46	--	40' - 60"	
M-1	3200	1506	89	17.0	7.0	5.0	7104	3.2	49	--	--	
M-1	4700	1927	111	18.0	8.0	5.0	11,327	5.0	52	--	--	
M-1	4500	2508	141	22.0	12.0	5.0	14,175	5.8	62	--	15' Bridge	
M-1	2700	2729	149	22.0	12.0	5.0	8505	3.5	62	--	--	
M-1	1700	2927	160	24.0	14.0	5.0	5984	2.4	68	--	30' Bridge	
M-1	4500	3393	180	26.0	16.0	5.0	17,505	6.9	73	--	--	
M-1	4500	3789	201	28.0	18.0	5.0	19,170	7.4	78	--	--	
M-1	4000	4065	210	28.0	18.0	5.0	17,040	6.6	78		30' Bridge	
M-1	1600	4100	212	28.0	18.0	5.0	6816	--	78			
L-1	1700	92	9	13.0	3.0	5.0	2516	1.2	38	--	--	
L-2	5500	136	12	13.0	3.0	5.0	8140	4.0	38	--	--	
L-3	2300	113	11	13.0	3.0	5.0	3404	1.7	38	--	--	
L-4	5300	131	12	13.0	3.0	5.0	7844	3.9	38	--	--	
Total-1	61,100						156,006	63.9				73,129.00
M-2	4000	306	24	13.0	3.0	5.0	5920	2.9	38	--	--	
M-2	4000	789	54	13.0	3.0	5.0	5920	2.9	38	--	--	
M-2	3700	1102	71	15.0	5.0	5.0	6845	3.2	44		40' - 66"	
M-2	1300	1258	80	16.0	6.0	5.0	2652	1.2	46		30' - 66"	
Total-2	13,000						21,337	10.2				11,452.00
M-3	5000	338	27	13.0	3.0	5.0	7400	3.7	38	--	--	
M-3	4500	746	51	13.0	3.0	5.0	6660	3.3	38	--	--	
M-3	4100	1142	73	16.0	6.0	5.0	8364	3.8	46		15' Bridge	
Total-3	13,600						22,424	10.8				11,261.00
M-4	5000	106	20	13.0	3.0	5.0	7400	3.7	38	--	--	
M-4	4600	322	50	13.0	3.0	5.0	6808	3.4	38	--	30' - 60"	
M-4	3400	499	73	15.0	5.0	5.0	6290	3.0	44	--	--	
M-4	1900	1802	217	26.0	16.0	5.0	7391	2.9	73	--	--	
M-4	2700	1972	234	28.0	18.0	5.0	11,502	4.5	78	--	--	
M-4	3100	2372	271	30.0	20.0	5.0	14,353	5.6	84	--	--	
M-4	1500	2459	280	30.0	20.0	5.0	6945	--	84	--	--	
L-1	6000	322	50	13.0	3.0	5.0	8880	4.4	38	--	--	
L-1	4700	452	67	14.0	4.0	5.0	7849	3.8	41		40' - 66"	
L-1	2300	534	77	15.0	5.0	5.0	4255	2.0	44	--	--	
L-2	6000	264	43	13.0	3.0	5.0	8880	4.4	38	--	--	
L-2	5000	453	67	14.0	4.0	5.0	8350	4.0	41	--	--	
L-2	1400	1125	144	20.0	10.0	5.0	3892	1.6	57	--	--	
L-3	3400	120	22	13.0	3.0	5.0	5032	2.5	38	--	--	
L-4	4400	222	37	13.0	3.0	5.0	6512	3.2	38		40' - 48"	
Total-4	55,400						114,339	49.0				50,617.00

ENGINEERING AND DESIGN DATA

Area 6 - Meggett - Hollywood

CANAL No. (1)	LENGTH Ft. (2)	WATERSHED Ac. (3)	DISCHARGE c.f.s. (4)	CHANNEL DIMENSIONS TOP WIDTH Ft. (5)	BOTTOM WIDTH Ft. (6)	AVERAGE DEPTH Ft. (7)	EXCAVATION Cu. Yds. (8)	RT. OF WAY CLEARING Ac. (9)	REQUIRED RT. OF WAY WIDTH Ft. (10)	CULVERTS LOWERING Length & Size (11)	CULVERTS & BRIDGES - NEW Length & Size (12)	TOTAL ESTIMATED COST Dollars (13)
M-5	3500	207	34	13.0	3.0	5.0	5180	2.6	38	--	--	
M-5	2700	368	57	13.0	3.0	5.0	3996	2.0	38	--	--	
M-5	5300	846	116	18.0	8.0	5.0	12,773	5.6	52	--	80' - 66"	
M-5	3800	1124	144	20.0	10.0	5.0	10,564	--	57	--	--	
L-1	4200	186	32	13.0	3.0	5.0	6216	1.1	38	--	30' - 42"	
Total-5	19,500						38,729	11.3				19,694.00
M-6	4300	368	57	13.0	3.0	5.0	6364	3.2	38	--	40' - 60"	
M-6	1600	412	62	14.0	4.0	5.0	2672	1.3	41	--	--	
M-6	2200	647	91	16.0	6.0	5.0	4488	2.0	46	--	--	
M-6	1300	1079	140	20.0	10.0	5.0	3614	1.5	57	--	15' Bridge 15' Wooden Trestle	
M-6	1900	1140	144	20.0	10.0	5.0	5282	--	57	--	--	
L-1	2700	102	19	13.0	3.0	5.0	3996	2.0	38	--	--	
L-2	1800	117	21	13.0	3.0	5.0	2664	1.3	38	--	40' - 42"	
L-2	3300	255	42	13.0	3.0	5.0	4884	2.4	38	--	--	
Total-6	19,100						33,964	13.7				19,797.00
M-7	3000	258	42	13.0	3.0	5.0	4440	2.2	38	--	50' - 54" 40' - 54"	
M-7	2200	435	65	14.0	4.0	5.0	3674	--	41	--	40' - 60"	
Total-7	5200						8114	2.2				6,976.00
M-8	4000	398	60	14.0	4.0	5.0	6680	0.8	41	--	40' - 42"	
Total-8	4000						6680	0.8				4,292.00
M-9	3200	363	56	13.0	3.0	5.0	4736	0.7	38	--	--	
Total-9	3200						4736	0.7				2,613.00
M-10	3500	195	33	13.0	3.0	5.0	5180	2.6	38	--	--	
M-10	1400	450	67	14.0	4.0	5.0	2338	1.1	41	--	40' - 54"	
M-10	3700	712	98	17.0	7.0	5.0	8214	--	49	--	--	
Total-10	8600						15,732	3.7				8,221.00
M-11	4400	184	32	13.0	3.0	5.0	6512	3.2	38	--	40' - 48"	
M-11	1200	310	49	13.0	3.0	5.0	1776	0.9	38	--	40' - 54"	
M-11	1400	358	55	13.0	3.0	5.0	2072	1.0	38	--	--	
M-11	4400	731	100	17.0	7.0	5.0	9768	4.3	49	--	--	
M-11	2000	807	110	17.0	7.0	5.0	4440	2.0	49	--	--	
M-11	1300	1180	151	20.0	10.0	5.0	3614	1.5	57	--	15' Bridge	
M-11	2800	1295	162	20.0	10.0	5.0	7784	--	57	--	20' Trestle	
L-1	4700	207	35	13.0	3.0	5.0	6956	3.5	38	--	40' - 48"	
L-2	5800	297	47	13.0	3.0	5.0	8584	4.3	38	40' - 36"	--	
Total-11	28.000						51,506	20.7				28,826.00
M-12	6000	230	38	13.0	3.0	5.0	8880	--	38	--	--	
Total-12	6000						8880	--				4,440.00
M-13	3900	232	38	13.0	3.0	5.0	5772	2.2	38	--	50' - 54" 40' - 54"	
M-13	3800	570	82	16.0	6.0	5.0	7752	1.8	46	--	15' Bridge	
Total-13	7700						13,524	4.0				11,709.00

ENGINEERING AND DESIGN DATA

Area 6 - Meggett - Hollywood

CANAL	LENGTH	WATERSHED	DISCHARGE	CHANNEL DIMENSIONS			EXCAVATION	RT. OF WAY CLEARING	REQUIRED RT. OF WAY WIDTH	CULVERTS LOWERING	CULVERTS & BRIDGES - NEW	TOTAL ESTIMATED COST
No. (1)	Ft. (2)	Ac. (3)	c.f.s. (4)	TOP WIDTH Ft. (5)	BOTTOM WIDTH Ft. (6)	AVERAGE DEPTH Ft. (7)	Cu. Yds. (8)	Ac. (9)	Ft. (10)	Length & Size (11)	Length & Size (12)	Dollars (13)
M-14	4100	99	18	13.0	3.0	5.0	6068	3.0	38	--	--	
M-14	2900	223	37	13.0	3.0	5.0	4292	2.1	38	--	--	
M-14	800	269	44	13.0	3.0	5.0	1184	0.6	38	50' - 48"	--	
M-14	2400	322	50	13.0	3.0	5.0	3552	1.8	38	--	30' - 60"	
M-14	1100	726	99	17.0	7.0	5.0	2442	1.1	49	--	--	
M-14	2900	1393	192	24.0	14.0	5.0	10,208	--	76	--	30' Bridge	
L-1	7500	168	29	13.0	3.0	5.0	11,100	5.5	38	--	40' - 48"	
											40' - 48"	
L-1	500	186	32	13.0	3.0	5.0	740	0.4	38	--	40' - 48"	
L-1	3500	365	56	13.0	3.0	5.0	5180	2.6	38	--	30' - 54"	
L-2	5300	276	44	13.0	3.0	5.0	7844	3.9	38	--	40' - 30"	
											30' - 48"	
Total-14	31,000						52,610	21.0				31,665.00
M-15	2000	108	20	13.0	3.0	5.0	2960	1.5	38	--	30' - 42"	
M-15	3500	324	51	13.0	3.0	5.0	5180	1.6	38		40' - 60"	
											40' - 60"	
M-15	1200	355	54	13.0	3.0	5.0	1776	--	38	--	--	
M-15	2600	1182	152	18.0	8.0	5.0	6266	--	52	--	--	
L-1	3300	156	27	13.0	3.0	5.0	4884	2.4	38	--	40' - 48"	
L-1	900	359	55	13.0	3.0	5.0	1332	0.7	38	--	40' - 60"	
L-1	3800	596	85	16.0	6.0	5.0	7752	3.5	46	--	15' Bridge	
L-1	900	620	87	16.0	6.0	5.0	1836	0.5	46	--	--	
L-2	3100	129	23	13.0	3.0	5.0	4588	2.3	38	--	40' - 42"	
Total-15	21,300						36,574	12.5				22,844.00
M-16	3800	262	43	13.0	3.0	5.0	5624	2.8	38	--	40' - 54"	
											40' - 54"	
M-16	4500	483	70	15.0	5.0	5.0	8325	3.9	44	--	--	
M-16	4300	630	88	16.0	6.0	5.0	8772	3.9	46	--	15' Bridge	
M-16	6000	917	122	18.0	8.0	5.0	14,460	6.3	52	--	15' Bridge	
M-16	4700	1154	148	20.0	10.0	5.0	13,066	5.5	57	--	15' Bridge	
M-16	3600	1240	154	20.0	10.0	5.0	10,008	--	57	--	15' Trestle	
Total-16	26,900						60,255	22.4				34,411.00
M-17	6000	736	50	13.0	3.0	5.0	8880	4.4	38	--	15' Bridge	
M-17	3700	1086	71	16.0	6.0	5.0	7548	3.4	46	--	15' Bridge	
M-17	3100	1262	80	16.0	6.0	5.0	6324	2.8	46	--	--	
M-17	6400	3985	206	26.0	16.0	5.0	24,896	9.8	73	--	30' Trestle	
M-17	4500	4275	220	28.0	18.0	5.0	19,170	7.4	78	--	--	
M-17	4500	4595	233	28.0	18.0	5.0	19,170	7.4	78	--	30' Bridge	
M-17	2700	4717	236	30.0	20.0	5.0	12,501	4.8	84	--	--	
M-17	2000	5467	269	32.0	22.0	5.0	10,000	3.8	89	--	--	
M-17	3100	6587	314	36.0	26.0	5.0	17,794	6.6	99	--	--	
M-17	4500	6971	327	36.0	26.0	5.0	25,830	9.6	99	--	--	
M-17	7700	7914	365	40.0	30.0	5.0	49,896	14.8	110	--	30' Bridge	
L-1	4800	575	41	13.0	3.0	5.0	7104	3.5	38	--	--	
L-1	3900	819	56	13.0	3.0	5.0	5772	2.9	38	--	15' Bridge	
L-1	3900	1773	105	17.0	7.0	5.0	8658	3.8	49	--	--	
L-2	5000	304	24	13.0	3.0	5.0	7400	3.7	38	--	40' - 54"	

ENGINEERING AND DESIGN DATA

Area 6 - Meggett - Hollywood

CANAL	LENGTH	WATERSHED	DISCHARGE	CHANNEL DIMENSIONS			EXCAVATION	RT. OF WAY CLEARING	REQUIRED RT. OF WAY WIDTH	CULVERTS LOWERING	CULVERTS & BRIDGES - NEW	TOTAL ESTIMATED COST
No. (1)	Ft. (2)	Ac. (3)	c.f.s. (4)	TOP WIDTH Ft. (5)	BOTTOM WIDTH Ft. (6)	AVERAGE DEPTH Ft. (7)	Cu. Yds. (8)	Ac. (9)	Ft. (10)	Length & Size (11)	Length & Size (12)	Dollars (13)
L-2	4800	557	40	13.0	3.0	5.0	7104	3.5	38	--	--	
L-3	4500	304	24	13.0	3.0	5.0	6660	3.3	38	--	40' - 48"	
L-3	4200	552	40	13.0	3.0	5.0	6216	3.1	38	--	50' - 60"	
L-3	4900	800	54	13.0	3.0	5.0	7252	3.6	38	--	--	
L-4	2600	202	17	13.0	3.0	5.0	3848	1.9	38	--	--	
Total-17	86,800						262,023	104.1				119,768.00
M-18	2800	221	37	13.0	3.0	5.0	4144	2.1	38	--	40' - 48"	
M-18	3900	377	58	14.0	4.0	5.0	6513	3.1	41	--	40' - 60'	
M-18	2000	418	62	14.0	4.0	5.0	3340	1.2	41	--	--	
Total-18	8700						13,997	6.4				8,050.00
M-19	600	46	10	13.0	3.0	5.0	888	0.4	38	--	40' - 30"	
M-19	2800	90	17	13.0	3.0	5.0	4144	2.1	38	--	50' - 54"	
M-19	2000	298	48	13.0	3.0	5.0	2960	1.5	38	--	40' - 60"	
M-19	500	423	63	14.0	4.0	5.0	835	--	41	--	--	
L-1	2100	130	23	13.0	3.0	5.0	3108	1.5	38	--	--	
L-2	2500	115	21	13.0	3.0	5.0	3700	1.8	38	--	200' - 18"	
Total-19	10,500						15,635	7.3				10,319.00
Area 6 Grand Total	429,600						937,065	364.7				480,084.00

ENGINEERING AND DESIGN DATA

Area 7 - Wadmalaw Island

CANAL No. (1)	LENGTH Ft. (2)	WATERSHED Ac. (3)	DISCHARGE c.f.s. (4)	CHANNEL DIMENSIONS: TOP WIDTH Ft. (5)	CHANNEL DIMENSIONS: BOTTOM WIDTH Ft. (6)	CHANNEL DIMENSIONS: AVERAGE DEPTH Ft. (7)	EXCAVATION Cu. Yds. (8)	RT. OF WAY CLEARING Ac. (9)	REQUIRED RT. OF WAY WIDTH Ft. (10)	CULVERTS LOWERING Length & Size (11)	CULVERTS & BRIDGES - NEW Length & Size (12)	TOTAL ESTIMATED COST Dollars (13)
M-1	3900	442	67	14.0	4.0	5.0	6513	3.1	41	--	--	
M-1	1800	799	110	17.0	7.0	5.0	3996	1.8	49	--	--	
M-1	3400	985	131	19.0	9.0	5.0	8806	2.7	55	--	--	
L-1	3400	274	45	13.0	3.0	5.0	5032	2.5	38	--	--	
L-2	1000	85	17	13.0	3.0	5.0	1480	0.7	38	--	--	
Total-1	13,500						25,827	10.8				12,438.00
M-2	3500	237	40	13.0	3.0	5.0	5180	2.6	38	--	--	
M-2	4200	442	67	15.0	5.0	5.0	7770	3.7	44			
M-2	3200	612	88	16.0	6.0	5.0	6528	2.9	46		15' Bridge	
M-2	1400	798	110	18.0	8.0	5.0	3374	1.5	52	--	15' Bridge	
M-2	1900	878	118	18.0	8.0	5.0	4579	2.0	52	--	--	
M-2	3000	1120	145	20.0	10.0	5.0	8340	3.5	57	--	15' Bridge	
L-1	2200	152	28	13.0	3.0	5.0	3256	1.6	38	--	40' - 42"	
Total-2	19,400						39,027	17.8				22,284.00
M-3	2300	174	30	13.0	3.0	5.0	3404	1.7	38	--	40' - 48"	
M-3	4300	530	77	16.0	6.0	5.0	8772	3.9	46	--	--	
M-3	4100	875	118	19.0	9.0	5.0	10,619	4.6	55	--	15' Bridge	
M-3	4200	1134	145	20.0	10.0	5.0	11,676	1.8	57	--	--	
M-3	2900	1160	148	22.0	12.0	5.0	9135	--	62	--	--	
Total-3	17,800						43,606	12.0				21,761.00
M-4	3500	285	47	13.0	3.0	5.0	5180	2.6	38	--	30' - 42"	
M-4	3200	582	83	16.0	6.0	5.0	6528	2.9	46	--	30' - 60"	
M-4	3300	780	106	17.0	7.0	5.0	7326	3.3	49	--	--	
M-4	3200	1015	134	20.0	10.0	5.0	8896	3.7	57	--	15' Bridge	
M-4	3000	1214	154	22.0	12.0	5.0	9450	1.3	62	--	--	
Total-4	16,200						37,380	13.8				19,774.00
M-5	4000	267	43	13.0	3.0	5.0	5920	1.5	38	--	--	
M-5	2900	545	78	16.0	6.0	5.0	5916	2.7	46	--	--	
M-5	3500	759	104	18.0	8.0	5.0	8435	--	52	--	--	
Total-5	10,400						20,271	4.2				8,646.00
M-6	2900	198	33	13.0	3.0	5.0	4292	--	38	--	--	
M-6	3600	472	70	15.0	5.0	5.0	6660	3.1	44	--	40' - 66"	
M-6	3200	537	78	16.0	6.0	5.0	6528	2.3	46	--	--	
Total-6	9700						17,480	5.4				8,598.00
M-7	3700	373	57	14.0	4.0	5.0	6179	3.0	41	--	40' - 48"	
M-7	2900	562	81	16.0	6.0	5.0	5916	1.8	46	--	--	
M-7	2700	803	110	18.0	8.0	5.0	6507	--	52	--	--	
Total-7	9300						18,602	4.8				10,268.00
M-8	3100	172	30	13.0	3.0	5.0	4588	2.3	38	--	40' - 42"	
M-8	2200	202	35	13.0	3.0	5.0	3256	0.9	38	--	--	
Total-8	5300						7844	3.2				4,567.00
M-9	4000	230	39	13.0	3.0	5.0	5920	2.9	38	--	40' - 54"	
M-9	2100	270	43	13.0	3.0	5.0	3108	--	38	--	--	
Total-9	6100						9028	2.9				4,989.00

ENGINEERING AND DESIGN DATA

Area 7-Wadmalaw Island

CANAL	LENGTH	WATERSHED	DISCHARGE	CHANNEL DIMENSIONS			EXCAVATION	RT. OF WAY CLEARING	REQUIRED RT. OF WAY WIDTH	CULVERTS LOWERING	CULVERTS & BRIDGES - NEW	TOTAL ESTIMATED COST
No. (1)	Ft. (2)	Ac. (3)	c.f.s. (4)	TOP WIDTH Ft. (5)	BOTTOM WIDTH Ft. (6)	AVERAGE DEPTH Ft. (7)	Cu. Yds. (8)	Ac. (9)	Ft. (10)	Length & Size (11)	Length & Size (12)	Dollars (13)
M-10	3500	317	50	13.0	3.0	5.0	5180	2.6	38	--	--	
M-10	3900	470	69	15.0	5.0	5.0	7215	3.4	44	--	--	
M-10	4200	1150	148	22.0	12.0	5.0	13,230	--	62	--	--	
L-1	3000	170	30	13.0	3.0	5.0	4440	1.4	38	--	--	
L-1	1900	393	60	14.0	4.0	5.0	3173	--	41	--	--	
Total-10	16,500						33,238	7.4				15,554.00
M-11	1800	200	33	13.0	3.0	5.0	2664	1.3	38	--	--	
M-11	2100	230	38	13.0	3.0	5.0	3108	--	38			
Total-11	3900						5772	1.3				2,675.00
M-12	3000	207	35	13.0	3.0	5.0	4440	2.2	38	--	40' - 24" 30' - 48"	
M-12	2200	340	53	13.0	3.0	5.0	3256	1.0	38	--	--	
M-12	4300	490	72	15.0	5.0	5.0	7956	--	44	--	30' - 54"	
Total-12	9500						15,652	3.2				8,643.00
M-13	2500	48	11	13.0	3.0	5.0	3700	1.8	38	--	--	
M-13	2700	114	21	13.0	3.0	5.0	3996	2.0	38	--	40' - 36"	
M-13	4000	259	42	13.0	3.0	5.0	5920	2.9	38	--	--	
M-13	4600	512	75	16.0	6.0	5.0	9384	4.2	46	--	40' - 60"	
M-13	3400	572	82	17.0	7.0	5.0	7548	--	46	--	--	
Total-13	17,200						30,548	10.9				15,043.00
M-14	1700	133	24	13.0	3.0	5.0	2516	1.2	38	--	40' - 48"	
M-14	1600	161	28	13.0	3.0	5.0	2368	0.8	38	--	--	
Total-14	3300						4884	2.0				3,345.00
M-15	2700	175	30	13.0	3.0	5.0	3996	2.0	38	--	--	
M-15	3500	376	58	14.0	4.0	5.0	5845	2.8	41	--	40' - 54"	
M-15	3500	588	85	16.0	6.0	5.0	7140	3.2	46	--	--	
M-15	2800	670	93	16.0	6.0	5.0	5712	1.3	46	--	20' - 60"	
Total-15	12,500						22,693	9.3				11,118.00
M-16	3000	138	25	13.0	3.0	5.0	4440	1.6	38	--	--	
Total-16	3000						4440	1.6				2,225.00
Area 7 Grand Total	173,600						336,292	110.6				171,928.00

ENGINEERING AND DESIGN DATA

Area 8-Edisto Island

CANAL No. (1)	LENGTH Ft. (2)	WATERSHED Ac. (3)	DISCHARGE c.f.s. (4)	CHANNEL DIMENSIONS TOP WIDTH Ft. (5)	BOTTOM WIDTH Ft. (6)	AVERAGE DEPTH Ft. (7)	EXCAVATION Cu. Yds. (8)	RT. OF WAY CLEARING Ac. (9)	REQUIRED RT. OF WAY WIDTH Ft. (10)	CULVERTS LOWERING Length & Size (11)	CULVERTS & BRIDGES - NEW Length & Size (12)	TOTAL ESTIMATED COST Dollars (13)
M-1	2800	235	39	13.0	3.0	5.0	4144	2.0	38	--	40' - 48"	
											40' - 54"	
M-1	2700	352	54	14.0	4.0	5.0	4509	2.2	41	--	30' - 60"	
M-1	6800	573	83	17.0	7.0	5.0	15,096	3.0	49	--	--	
Total-1	12,300						23,749	7.2				12,396.00
M-2	4300	170	29	13.0	3.0	5.0	6364	3.1	38	--	--	
Total-2	4300						6364	3.1				2,676.00
M-3	1700	120	23	13.0	3.0	5.0	2516	1.2	38	--	80' - 42"	
M-3	4900	329	51	13.0	3.0	5.0	7252	3.6	38	--	30' - 48"	
Total-3	6600						9768	4.8				6,090.00
M-4	4500	120	23	13.0	3.0	5.0	6660	2.8	38	--	--	
Total-4	4500						6660	2.8				2,645.00
M-5	3000	129	23	13.0	3.0	5.0	4440	2.2	38	--	--	
M-5	3200	368	57	13.0	3.0	5.0	4736	--	41	--	30' - 48"	
M-5	700	780	106	17.0	7.0	5.0	1554	--	49	--	--	
L-1	1900	209	35	13.0	3.0	5.0	2812	1.4	38	--	50' - 54"	
L-1	3500	402	61	14.0	4.0	5.0	5845	1.5	41	--	--	
Total-5	12,300						19,387	5.1				10,714.00
M-6	5400	269	44	13.0	3.0	5.0	7992	3.9	38	--	--	
Total-6	5400						7992	3.9				3,363.00
M-7	1600	90	17	13.0	3.0	5.0	2368	1.1	38	--	40' - 36"	
M-7	4600	366	56	13.0	3.0	5.0	6808	2.1	38	--	--	
Total-7	6200						9176	3.2				4,724.00
M-8	6500	389	60	14.0	4.0	5.0	10,855	5.2	41	--	30' - 48"	
											15' Bridge	
M-8	3300	488	71	15.0	5.0	5.0	6105	--	44	--	--	
Total-8	9800						16,960	5.2				10,085.00
M-9	4000	235	39	13.0	3.0	5.0	5920	2.9	38	--	--	
M-9	5500	465	69	14.0	4.0	5.0	9185	4.4	41	--	15' Bridge	
M-9	800	497	73	15.0	5.0	5.0	1480	--	44	--	--	
M-9	2600	787	107	17.0	7.0	5.0	5772	--	49	--	--	
L-1	2800	120	22	13.0	3.0	5.0	4144	2.1	38	--	40' - 42"	
L-1	3900	240	40	13.0	3.0	5.0	5772	2.9	38	--	--	
Total-9	19,600						32,273	12.3				16,733.00
M-10	3400	127	23	13.0	3.0	5.0	5032	2.5	38	--	40' - 42"	
M-10	2700	196	34	13.0	3.0	5.0	3996	--	38	--	--	
Total-10	6100						9028	2.5				4,803.00
M-11	3300	189	33	13.0	3.0	5.0	4884	2.4	38	--	--	
M-11	4000	636	89	16.0	6.0	5.0	8160	3.7	46	--	--	
M-11	4100	827	111	18.0	8.0	5.0	9881	--	52	--	--	
L-1	4300	166	29	13.0	3.0	5.0	6364	3.1	38	--	40' - 48"	
L-1	800	180	31	13.0	3.0	5.0	1184	--	38	--	--	
Total-11	16,500						30,473	9.2				10,336.00

ENGINEERING AND DESIGN DATA

Area 8-Edisto Island

CANAL No. (1)	LENGTH Ft. (2)	WATERSHED Ac. (3)	DISCHARGE c.f.s. (4)	CHANNEL DIMENSIONS TOP WIDTH Ft. (5)	BOTTOM WIDTH Ft. (6)	AVERAGE DEPTH Ft. (7)	EXCAVATION Cu. Yds. (8)	RT. OF WAY CLEARING Ac. (9)	REQUIRED RT. OF WAY WIDTH Ft. (10)	CULVERTS LOWERING Length & Size (11)	CULVERTS & BRIDGES - NEW Length & Size (12)	TOTAL ESTIMATED COST Dollars (13)
M-12	3000	266	43	13.0	3.0	5.0	4440	2.2	38	--	40' - 54"	
M-12	4000	374	56	13.0	3.0	5.0	5920	--	38	--	--	
Total-12	7000						10,360	2.2				5,780.00
M-13	3500	276	45	13.0	3.0	5.0	5180	2.6	38	--	50' - 60"	
Total-13	3500						5180	2.6				3,635.00
M-14	3900	230	38	13.0	3.0	5.0	5772	2.9	38	--	50' - 54"	
M-14	500	240	39	13.0	3.0	5.0	740	--	38	--	--	
Total-14	4400						6512	2.9				3,818.00
M-15	1200	87	17	13.0	3.0	5.0	1776	0.9	38	--	40' - 36"	
M-15	5800	411	61	14.0	4.0	5.0	9686	1.1	41	--	--	
Total-15	7000						11,462	2.0				6,547.00
M-16	4800	187	32	13.0	3.0	5.0	7104	3.5	38	50' - 42"	--	
M-16	3600	281	45	13.0	3.0	5.0	5328	--	38	--	--	
Total-16	8400						12,432	3.5				6,085.00
M-17	3000	244	39	13.0	3.0	5.0	4440	2.2	38	--	20' - 54"	
M-17	2200	329	51	13.0	3.0	5.0	3256	1.6	38	--	40' - 60"	
M-17	2200	408	61	14.0	4.0	5.0	3674	1.8	41	--	40' - 66"	
M-17	1700	449	67	14.0	4.0	5.0	2839	--	41	--	--	
Total-17	9100						14,209	5.6				9,292.00
M-18	4100	214	35	13.0	3.0	5.0	6068	3.0	38	--	40' - 54"	
M-18	2900	347	54	13.0	3.0	5.0	4292	--	38	--	40' - 60"	
M-18	800	386	59	14.0	4.0	5.0	1336	--	41	--	15' Bridge	
M-18	3400	547	78	15.0	5.0	5.0	6290	--	44	--	--	
Total-18	11,200						17,986	3.0				12,485.00
M-19	2400	124	22	13.0	3.0	5.0	3552	1.8	38	--	40' - 42"	
M-19	4500	317	50	13.0	3.0	5.0	6660	--	38	--	--	
M-19	3500	471	68	14.0	4.0	5.0	5845	--	41	--	--	
M-19	1700	899	119	18.0	8.0	5.0	4097	--	52	--	--	
L-1	7300	403	61	14.0	4.0	5.0	12,191	5.1	41	--	--	
Total-19	19,400						32,345	6.9				15,871.00
M-20	4300	184	32	13.0	3.0	5.0	6364	3.1	38	--	--	
Total-20	4300						6364	3.1				2,676.00
M-21	2700	115	21	13.0	3.0	5.0	3996	2.0	38	--	20' - 42"	
M-21	2200	170	30	13.0	3.0	5.0	3256	1.6	38	--	--	
Total-21	4900						7252	3.6				4,223.00
M-22	3200	150	26	13.0	3.0	5.0	4736	2.3	38	--	50' - 48"	
M-22	5500	343	53	13.0	3.0	5.0	8140	2.2	38	--	--	
Total-22	8700						12,876	4.5				6,834.00
Area 8 Grand Total	191,500						308,808	99.2				161,811.00

ENGINEERING AND DESIGN DATA

Area 9 - Mc Clellanville

CANAL No. (1)	LENGTH Ft. (2)	WATERSHED Ac. (3)	DISCHARGE c.f.s. (4)	CHANNEL DIMENSIONS TOP WIDTH Ft. (5)	BOTTOM WIDTH Ft. (6)	AVERAGE DEPTH Ft. (7)	EXCAVATION Cu. Yds. (8)	RT. OF WAY CLEARING Ac. (9)	REQUIRED RT. OF WAY WIDTH Ft. (10)	CULVERTS LOWERING Length & Size (11)	CULVERTS & BRIDGES - NEW Length & Size (12)	TOTAL ESTIMATED COST Dollars (13)
M-1	6000	582	42	14.0	4.0	5.0	10,020	4.8	41	--	--	
M-1	5000	987	65	17.0	7.0	5.0	11,100	5.6	55	--	15' R.C.Bridge	
M-1	1500	1832	109	22.0	12.0	5.0	4725	1.9	62	--	--	
M-1	1200	2334	135	24.0	14.0	5.0	4224	1.7	68	--	15' Bridge	
M-1	5100	2656	145	26.0	16.0	5.0	19,839	7.9	73	--	15' Bridge	
L-1	5900	356	28	13.0	3.0	5.0	8732	4.3	38	--	40' - 42"	
L-2	6000	476	35	13.0	3.0	5.0	8880	4.4	38	--	15' Bridge	
											40' - 36"	
L-3	5700	267	22	13.0	3.0	5.0	8436	4.1	38	--	--	
Total-1	36,400						75,956	34.7				42,326.00
M-2	7000	588	42	13.0	3.0	5.0	10,360	5.1	38	--	15' Bridge	
M-2	1000	799	55	14.0	4.0	5.0	1670	0.8	41	--	15' Bridge	
M-2	1500	849	57	14.0	4.0	5.0	2505	1.2	41	--	--	
M-2	2100	1401	87	17.0	7.0	5.0	4662	2.1	49	--	--	
M-2	1100	1700	101	18.0	8.0	5.0	2651	1.2	52	--	15' Bridge	
M-2	1400	1739	103	18.0	8.0	5.0	3374	--	52	--	--	
M-2	900	2077	120	19.0	9.0	5.0	2331	--	55	--	--	
L-1	3600	474	35	13.0	3.0	5.0	5328	2.6	38	--	--	
L-2	4800	131	12	13.0	3.0	5.0	7104	3.5	38	--	40' - 24"	
L-3	4200	255	20	13.0	3.0	5.0	6216	3.1	38	--	40' - 36"	
L-3	2200	310	24	13.0	3.0	5.0	3256	1.6	38	--	40' - 60"	
Total-2	29,800						49,457	21.2				28,831.00
M-3	4200	172	15	13.0	3.0	5.0	6216	2.2	38	--	40' - 24"	
Total-3	4200						6216	2.2				2,616.00
M-4	3600	775	53	14.0	4.0	5.0	6012	2.9	41	--	--	
M-4	1600	1536	94	17.0	7.0	5.0	3552	1.6	49	--	--	
M-4	3100	1860	111	18.0	8.0	5.0	7470	1.6	52	--	15' Bridge	
L-1	4500	644	45	13.0	3.0	5.0	6660	3.3	38	--	15' Bridge	
Total-4	12,800						23,694	9.4				14,831.00
M-5	4600	718	48	13.0	3.0	5.0	6808	3.4	38	--	50' - 36"	
M-5	5100	900	60	14.0	4.0	5.0	8516	4.1	41	--	--	
Total-5	9700						15,324	7.5				8,285.00
M-6	8000	1578	21	13.0	3.0	5.0	11,840	5.9	38	--	30' - 60"	
M-6	8300	2555	32	13.0	3.0	5.0	12,284	6.1	38	--	--	
M-6	8000	4395	50	16.0	6.0	5.0	16,320	7.3	46	--	--	
M-6	8000	5453	60	17.0	7.0	5.0	17,760	7.9	49	--	--	
M-6	4500	9930	100	22.0	12.0	5.0	14,175	5.8	62	--	--	
M-6	6800	10,813	108	22.0	12.0	5.0	21,420	8.7	62	--	--	
M-6	1300	13,546	129	24.0	14.0	5.0	4576	1.9	68	--	45' Bridge	
M-6	2700	13,755	131	26.0	16.0	5.0	10,103	4.2	73	--	45' Bridge	
M-6	4000	14,072	133	26.0	16.0	5.0	15,560	6.2	73	--	--	
L-1	9300	2086	27	13.0	3.0	5.0	13,764	6.8	38	--	15' Bridge	
L-1	6700	3149	38	14.0	4.0	5.0	11,189	5.4	41	--	--	
L-1	6100	3763	42	14.0	4.0	5.0	10,187	4.9	41	--	--	
L-2	7000	1456	20	13.0	3.0	5.0	10,360	5.1	38	--	--	
L-2	10,200	2606	32	13.0	3.0	5.0	15,096	7.5	38	--	--	
Total-6	90,900						185,034	83.7				87,286.00

ENGINEERING AND DESIGN DATA

Area 9- Mc Clellanville

CANAL No. (1)	LENGTH Ft. (2)	WATERSHED Ac. (3)	DISCHARGE c.f.s. (4)	CHANNEL DIMENSIONS TOP WIDTH Ft. (5)	BOTTOM WIDTH Ft. (6)	AVERAGE DEPTH Ft. (7)	EXCAVATION Cu. Yds. (8)	RT. OF WAY CLEARING Ac. (9)	REQUIRED RT. OF WAY WIDTH Ft. (10)	CULVERTS LOWERING Length & Size (11)	CULVERTS & BRIDGES - NEW Length & Size (12)	TOTAL ESTIMATED COST Dollars (13)
M-7	2600	400	31	13.0	3.0	5.0	3848	1.9	38	--	50' - 60"	
M-7	4600	740	52	13.0	3.0	5.0	6808	1.8	38	--	15' Bridge	
Total-7	7200						10,656	3.7				7,966.00
M-8	8300	1000	14	11.0	3.0	4.0	8632	6.1	38	--	--	
Total-8	8300						8632	6.1				4,293.00
M-9	9200	1242	17	13.0	3.0	5.0	13,616	6.8	38	--	--	
M-9	1600	1300	18	13.0	3.0	5.0	2368	--	38	--	--	
Total-9	10,800						15,984	6.8				6,968.00
M-10	6000	380	29	13.0	3.0	5.0	8880	4.4	38	--	--	
M-10	6000	713	49	14.0	4.0	5.0	10,020	4.8	41	--	Two 15' Bridges	
M-10	5700	1143	73	17.0	7.0	5.0	12,654	5.6	49	--	Two 15' Bridges	
M-10	3100	1435	88	17.0	7.0	5.0	6882	3.1	49	--	--	
Total-10	20,800						38,436	17.9				23,374.00
M-11	4800	678	47	13.0	3.0	5.0	7104	3.5	38	--	--	
M-11	5000	1195	76	16.0	6.0	5.0	10,200	4.6	46	--	50' - 36"	
M-11	3400	1441	88	17.0	7.0	5.0	7548	1.7	49	--	40' - 36"	
Total-11	13,200						24,852	9.8				12,040.00
M-12	6500	1232	17	13.0	3.0	5.0	9620	4.8	38	--	50' - 60"	
M-12	7500	2370	30	13.0	3.0	5.0	11,100	5.5	38	--	15' Bridge	
M-12	9000	3347	40	14.0	4.0	5.0	15,030	7.2	41	--	--	
M-12	5600	6475	70	17.0	7.0	5.0	12,432	5.5	49	--	--	
M-12	5000	8131	84	19.0	9.0	5.0	12,950	5.6	55	--	--	
L-1	9000	1150	16	13.0	3.0	5.0	13,320	6.6	38	--	15' Bridge	
L-2	6800	713	11	13.0	3.0	5.0	10,064	5.0	38	--	--	
L-3	7600	1242	17	13.0	3.0	5.0	11,248	5.6	38	--	--	
L-4	7200	828	12	13.0	3.0	5.0	10,656	5.3	38	--	--	
Total-12	64,200						106,420	51.1				49,670.00
M-13	8000	1534	21	13.0	3.0	5.0	11,840	5.9	38	--	--	
M-13	7800	2167	27	13.0	3.0	5.0	11,544	5.7	38	--	15' Bridge	
M-13	7000	3145	37	13.0	3.0	5.0	10,360	5.1	38	--	--	
M-13	7400	3773	44	13.0	3.0	5.0	10,952	5.4	38	--	--	
Total-13	30,200						44,696	22.1				20,784.00
M-14	4500	241	4	13.0	3.0	5.0	6660	3.3	38	--	40' - 30"	
M-14	4000	825	12	13.0	3.0	5.0	5920	2.9	38	--	15' Bridge	
M-14	3000	954	14	13.0	3.0	5.0	4440	--	38	--	--	
L-1	4300	285	5	13.0	3.0	5.0	6364	3.2	38	--	40' - 42"	
Total-14	15,800						23,384	9.4				14,681.00
M-15	4900	860	13	13.0	3.0	5.0	7252	3.6	38	--	15' Bridge	
M-15	5000	1223	17	13.0	3.0	5.0	7400	3.7	38	--	--	
M-15	5500	1741	23	13.0	3.0	5.0	8140	4.0	38	--	15' Bridge	
M-15	4300	2123	27	13.0	3.0	5.0	6364	0.9	38	--	--	
Total-15	19,700						29,156	12.2				16,900.00
M-16	4700	674	11	13.0	3.0	5.0	6956	3.5	38	--	30' - 60"	
Total-16	4700						6956	3.5				3,822.00

ENGINEERING AND DESIGN DATA

Area 9 - Mc Clellanville

CANAL No. (1)	LENGTH Ft. (2)	WATERSHED Ac. (3)	DISCHARGE c.f.s. (4)	CHANNEL DIMENSIONS TOP WIDTH Ft. (5)	CHANNEL DIMENSIONS BOTTOM WIDTH Ft. (6)	CHANNEL DIMENSIONS AVERAGE DEPTH Ft. (7)	EXCAVATION Cu. Yds. (8)	RT. OF WAY CLEARING Ac. (9)	REQUIRED RT. OF WAY WIDTH Ft. (10)	CULVERTS LOWERING Length & Size (11)	CULVERTS & BRIDGES - NEW Length & Size (12)	TOTAL ESTIMATED COST Dollars (13)
M-17	3000	292	5	13.0	3.0	5.0	4440	2.2	38	40' - 24"	--	
M-17	6500	2546	32	13.0	3.0	5.0	9620	4.8	38	--	--	
M-17	9500	4716	53	16.0	6.0	5.0	19,380	8.7	46	--	--	
L-1	9500	888	13	13.0	3.0	5.0	14,060	6.9	38	--	--	
L-2	7000	666	11	13.0	3.0	5.0	10,360	5.1	38	--	--	
L-3	7400	1070	15	13.0	3.0	5.0	10,952	5.4	38	--	15' Bridge	
L-3	2500	1127	16	13.0	3.0	5.0	3700	1.8	38	--	--	
L-4	6300	1062	15	13.0	3.0	5.0	9342	4.8	38	--	40' - 60"	
L-4	3000	1292	18	13.0	3.0	5.0	4440	2.2	38	--	15' Bridge	
Total-17	54,700						86,294	41.9				41,278.00
M-18	7000	580	41	14.0	4.0	5.0	11,690	5.6	41	--	120' - 48"	
M-18	6500	1013	66	16.0	6.0	5.0	13,260	6.0	46	--	15' Bridge	
Total-18	13,500						24,950	11.6				14,668.00
M-19	5100	356	28	13.0	3.0	5.0	7548	3.7	38	--	50' - 42"	
M-19	5600	701	49	14.0	4.0	5.0	8288	4.5	41	--	15' Bridge	
M-19	5300	1023	67	16.0	6.0	5.0	7844	4.9	46	--	--	
Total-19	16,000						23,680	13.1				13,220.00
M-20	7600	1619	98	18.0	8.0	5.0	18,316	8.0	52	--	15' Bridge	
M-20	4900	2206	124	20.0	10.0	5.0	13,622	5.7	57	--	--	
M-20	5600	3092	169	26.0	16.0	5.0	21,784	8.6	73	--	--	
L-1	6500	242	20	13.0	3.0	5.0	9620	4.8	38	--	--	
Total-20	24,600						63,342	27.1				27,195.00
M-21	2300	448	7	13.0	3.0	5.0	3404	1.7	38	--	--	
M-21	4000	637	10	13.0	3.0	5.0	5920	2.9	38	--	--	
Total-21	6300						9324	4.6				3,941.00
M-22	3800	856	13	13.0	3.0	5.0	5624	2.8	38	--	--	
M-22	7200	1146	16	13.0	3.0	5.0	10,656	5.3	38	--	--	
Total-22	11,000						16,280	8.1				9,569.00
M-23	5300	1334	18	13.0	3.0	5.0	7844	3.9	38	--	15' Bridge	
M-23	7500	2133	21	13.0	3.0	5.0	11,100	5.5	38	--	--	
L-1	3300	212	3	13.0	3.0	5.0	4884	2.4	38	--	30' - 30"	
Total-23	16,100						23,828	11.8				12,268.00
M-24	11,900	874	13	13.0	3.0	5.0	17,612	8.7	38	--	--	
M-24	2900	2010	26	13.0	3.0	5.0	4292	2.1	38	--	--	
M-24	1600	3556	42	14.0	4.0	5.0	2672	1.3	41	--	--	
M-24	5900	6105	66	17.0	7.0	5.0	13,098	5.8	49	--	--	
L-1	6700	529	9	13.0	3.0	5.0	9916	4.9	38	--	--	
L-2	5300	833	12	13.0	3.0	5.0	7844	3.9	38	80' - 36"	40' - 30"	
											15' Bridge	
L-2	8200	1293	18	13.0	3.0	5.0	12,136	6.0	38	--	15' Bridge	
L-3	9700	1702	23	13.0	3.0	5.0	14,356	7.1	38	--	15' Bridge	
L-3	4800	2213	28	13.0	3.0	5.0	7104	3.5	38	--	15' Bridge	
Total-24	57,000						89,030	43.3				56,880.00

ENGINEERING AND DESIGN DATA

Area 9 - Mc Clellanville

CANAL No. (1)	LENGTH Ft. (2)	WATERSHED Ac. (3)	DISCHARGE c.f.s. (4)	CHANNEL DIMENSIONS TOP WIDTH Ft. (5)	BOTTOM WIDTH Ft. (6)	AVERAGE DEPTH Ft. (7)	EXCAVATION Cu. Yds. (8)	RT. OF WAY CLEARING Ac. (9)	REQUIRED RT. OF WAY WIDTH Ft. (10)	CULVERTS LOWERING Length & Size (11)	CULVERTS & BRIDGES - NEW Length & Size (12)	TOTAL ESTIMATED COST Dollars (13)
M-25	4400	442	7	13.0	3.0	5.0	6512	3.2	38	--	30' - 54"	
M-25	4600	1118	16	13.0	3.0	5.0	6808	3.4	38	--	--	
M-25	1900	3432	41	14.0	4.0	5.0	3172	1.5	41	--	--	
M-25	5800	4711	47	15.0	5.0	5.0	10,730	5.1	44	--	--	
M-25	3500	4976	56	16.0	6.0	5.0	7140	3.2	46	--	--	
L-1	5500	1302	18	13.0	3.0	5.0	8140	4.0	38	--	--	
L-1	5700	2289	29	13.0	3.0	5.0	8436	4.2	38	--	15' Bridge	
L-2	4400	352	6	13.0	3.0	5.0	6512	3.2	38	--	30' - 54"	
L-2	2600	508	8	13.0	3.0	5.0	3848	1.9	38	--	--	
Total-25	38,400						61,298	29.7				29,004.00
Area 9 Grand Total	616,300						1,062,879	492.5				552,696.00

ENGINEERING AND DESIGN DATA

Area 10 - Parkers Ferry

Sheet 1 of 2

CANAL No. (1)	LENGTH Ft. (2)	WATERSHED Ac. (3)	DISCHARGE c.f.s. (4)	CHANNEL DIMENSIONS TOP WIDTH Ft. (5)	BOTTOM WIDTH Ft. (6)	AVERAGE DEPTH Ft. (7)	EXCAVATION Cu. Yds. (8)	RT. OF WAY CLEARING Ac. (9)	REQUIRED RT. OF WAY WIDTH Ft. (10)	CULVERTS LOWERING Length & Size (11)	CULVERTS & BRIDGES - NEW Length & Size (12)	TOTAL ESTIMATED COST Dollars (13)
M-1	3500	237	39	13.0	3.0	5.0	5180	1.5	38	--	--	
Total-1	3500						5180	1.5				3,115.00
M-2	7300	545	39	13.0	3.0	5.0	10,804	5.4	38	--	30' - 66"	
M-2	5100	1085	71	15.0	5.0	5.0	9435	4.4	44	--	15' Trestle	
M-2	2200	1191	76	15.0	5.0	5.0	4070	0.9	44	--	--	
M-2	3500	2348	132	20.0	10.0	5.0	9730	--	57	--	--	
L-1	5700	724	50	13.0	3.0	5.0	8436	4.2	38	--	30' - 66" 15' Trestle	
L-1	2900	985	65	14.0	4.0	5.0	4843	1.2	41	--	--	
Total-2	26,700						47,318	16.1				28,809.00
M-3	1400	150	13	13.0	3.0	5.0	2072	1.0	38	--	40' - 48"	
M-3	3400	304	24	13.0	3.0	5.0	5032	1.8	38	--	--	
Total-3	4800						7104	2.8				3,846.00
M-4	3100	345	27	13.0	3.0	5.0	4588	2.3	38	30' - 36"	30' - 48"	
M-4	2500	745	52	13.0	3.0	5.0	3700	1.8	38	--	15' Bridge	
M-4	5000	1193	76	15.0	5.0	5.0	9250	4.4	44	--	--	
M-4	5100	1225	77	15.0	5.0	5.0	9435	1.3	44	--	--	
L-1	2800	246	20	13.0	3.0	5.0	4144	2.1	38	--	40' - 48"	
Total-4	18,500						31,117	11.9				17,844.00
M-5	3600	306	24	13.0	3.0	5.0	5328	2.6	38	40' - 18"	--	
M-5	5000	697	49	13.0	3.0	5.0	7400	3.7	38	--	15' Bridge	
M-5	1100	761	52	13.0	3.0	5.0	1628	0.8	38	--	--	
M-5	4300	1256	79	16.0	6.0	5.0	8772	3.9	46	--	15' Bridge	
M-5	4000	1468	89	16.0	6.0	5.0	8160	3.7	46	--	--	
L-1	3100	191	16	13.0	3.0	5.0	4588	2.3	38	--	40' - 42"	
Total-5	21,100						35,876	17.0				19,525.00
M-6	4900	1466	89	17.0	7.0	5.0	10,878	4.8	49	--	--	
M-6	4300	3086	169	22.0	12.0	5.0	13,545	5.5	62	--	--	
M-6	4000	7609	357	36.0	26.0	5.0	22,960	8.5	99	--	--	
M-6	4200	8115	374	38.0	28.0	5.0	25,662	9.5	105	--	45' Bridge	
M-6	5200	8598	389	40.0	30.0	5.0	33,696	12.4	110	--	45' Bridge	
L-1	5800	500	37	13.0	3.0	5.0	8574	4.3	38	--	30' - 36"	
L-1	2600	1199	77	15.0	5.0	5.0	4810	2.3	44	--	--	
L-2	2900	308	24	13.0	3.0	5.0	4292	2.1	38	--	30' - 60"	
L-2	3500	593	42	13.0	3.0	5.0	5180	2.6	38	--	--	
Total-6	37,400						129,597	52.0				60,880.00
M-7	1500	2822	154	22.0	12.0	5.0	4725	1.9	62	--	--	
M-7	4000	3615	189	26.0	16.0	5.0	15,560	6.2	73	--	--	
M-7	4200	4063	210	28.0	18.0	5.0	17,892	6.9	78	--	--	
L-1	5000	333	26	13.0	3.0	5.0	7400	3.7	78	--	30' - 36"	
Total-7	14,700						45,577	18.7				18,359.00
M-8	1800	3216	97	18.0	8.0	5.0	4338	1.9	52	--	15' Bridge	
M-8	3500	3559	106	19.0	9.0	5.0	9065	3.9	55	--	--	
M-8	3100	3714	108	20.0	10.0	5.0	8618	3.6	57	--	--	
Total-8	8400						22,021	9.4				10,670.00

Area 10 - Parkers Ferry

CANAL No. (1)	LENGTH Ft. (2)	WATERSHED Ac. (3)	DISCHARGE c.f.s. (4)	CHANNEL DIMENSIONS TOP WIDTH Ft. (5)	BOTTOM WIDTH Ft. (6)	AVERAGE DEPTH Ft. (7)	EXCAVATION Cu. Yds. (8)	RT. OF WAY CLEARING Ac. (9)	REQUIRED RT. OF WAY WIDTH Ft. (10)	CULVERTS LOWERING Length & Size (11)	CULVERTS & BRIDGES - NEW Length & Size (12)	TOTAL ESTIMATED COST Dollars (13)
M-9	(Main canal excavated and maintained by West Virginia Pulp and Paper Co. - capacity adequate)											
Area 10 Grand Total	135,100						323,790	129.4				163,048.00

ENGINEERING AND DESIGN DATA

Area 11 - Bear Swamp

CANAL No. (1)	LENGTH Ft. (2)	WATERSHED Ac. (3)	DISCHARGE c.f.s. (4)	CHANNEL DIMENSIONS TOP WIDTH Ft. (5)	BOTTOM WIDTH Ft. (6)	AVERAGE DEPTH Ft. (7)	EXCAVATION Cu. Yds. (8)	RT. OF WAY CLEARING Ac. (9)	REQUIRED RT. OF WAY WIDTH Ft. (10)	CULVERTS LOWERING Length & Size (11)	CULVERTS & BRIDGES - NEW Length & Size (12)	TOTAL ESTIMATED COST Dollars (13)
M-1	This canal as constructed is considered adequate											
Total-1												
M-2	11,400	1226	17	13.0	3.0	5.0	16,872	8.4	38	--	--	
M-2	This canal as constructed is adequate											
L-1	This canal as constructed is adequate											
Total-2	11,400						16,872	8.4				7,158.00
M-3	10,500	1086	71	16.0	6.0	5.0	21,420	9.6	46	--	--	
M-3	3300	1530	91	18.0	8.0	5.0	7953	3.5	52	--	--	
M-3	6100	1838	103	19.0	9.0	5.0	15,799	6.9	55	--	30' Trestle	
Total-3	19,900						45,172	20.0				32,657.00
M-4	7200	409	31	13.0	3.0	5.0	10,656	5.3	38	--	30' - 48" 40' - 60"	
M-4	3400	630	44	13.0	3.0	5.0	5032	2.5	38	--	40' - 66" 130' - 66"	
M-4	7300	991	65	16.0	6.0	5.0	14,892	1.5	46	--	15' Bridge	
Total-4	17,900						30,580	9.3				24,454.00
M-5	4100	469	35	13.0	3.0	5.0	6068	3.0	38	--	--	
M-5	4000	625	44	13.0	3.0	5.0	5920	2.9	38	--	--	
Total-5	8100						11,988	5.9				5,062.00
M-6	4500	674	11	13.0	3.0	5.0	6660	3.3	38	--	--	
M-6	4500	1019	15	13.0	3.0	5.0	6660	3.3	38	--	--	
Total-6	9000						13,320	6.6				5,640.00
M-7	5500	1389	20	13.0	3.0	5.0	8140	4.0	38	--	30' - 60"	
M-7	5800	2385	31	13.0	3.0	5.0	8584	4.3	38	--	--	
Total-7	11,300						16,724	8.3				7,944.00
M-8	9800	This canal as constructed is adequate										
M-8	2800	1760	104	18.0	8.0	5.0	6748	1.9	52	--	--	
Total-8	12,600						6748	1.9				3,102.00
Area 11 Grand Total	90,200						141,404	60.40				86,017.00

ENGINEERING AND DESIGN DATA

Area 12 - Caw Caw Swamp

CANAL	LENGTH	WATERSHED	DISCHARGE	CHANNEL DIMENSIONS			EXCAVATION	RT. OF WAY CLEARING	REQUIRED RT. OF WAY WIDTH	CULVERTS LOWERING	CULVERTS & BRIDGES - NEW	TOTAL ESTIMATED COST
No. (1)	Ft. (2)	Ac. (3)	c.f.s. (4)	TOP WIDTH Ft. (5)	BOTTOM WIDTH Ft. (6)	AVERAGE DEPTH Ft. (7)	Cu. Yds. (8)	Ac. (9)	Ft. (10)	Length & Size (11)	Length & Size (12)	Dollars (13)
M-1	4000	1470	90	17.0	7.0	5.0	8880	3.9	43	--	--	
M-1	4300	1718	102	17.0	7.0	5.0	9546	4.2	43	--	--	
M-1	400	2691	149	20.0	10.0	5.0	1112	0.5	51	--	--	
Total-1	8700						19,538	8.6				7,894.00
M-2	4500	508	37	13.0	3.0	5.0	6660	3.3	32	--	--	
M-2	4300	973	67	16.0	6.0	5.0	8772	3.9	40	--	--	
Total-2	8800						15,432	7.2				6,378.00
M-3	6000	1472	50	14.0	4.0	5.0	10,020	4.8	35	--	--	
M-3	5600	1943	63	16.0	6.0	5.0	11,424	5.1	40	--	15' Bridge	
M-3	3800	3043	93	18.0	8.0	5.0	9158	4.0	46	--	80' - 60"	
L-1	6300	821	31	13.0	3.0	5.0	9324	4.6	32	--	Two 15'Bridges	
Total-3	21,700						39,926	18.5				24,369.00
M-4	This canal as constructed is adequate											
Total-4												
M-5	This canal as constructed is adequate											
Total-5												
M-6	5500	704	27	13.0	3.0	5.0	8140	4.0	32	--	15' Bridge	
M-6	4800	1330	46	13.0	3.0	5.0	7104	3.5	32	--	--	
M-6	3100	3152	95	18.0	8.0	5.0	7471	3.3	46	--	30' Bridge	
M-6	4500	3577	106	18.0	8.0	5.0	10,845	4.8	46	--	--	
L-1	4000	851	32	13.0	3.0	5.0	5920	2.9	32	--	--	
L-1	3700	1178	42	13.0	3.0	5.0	5476	2.7	32	--	--	
Total-6	25,600						44,956	21.2				23,534.00
M-7	2900	2274	130	22.0	12.0	5.0	9135	3.7	56	--	15' Bridge	
M-7	4000	2728	151	24.0	14.0	5.0	14,080	5.7	62	--	--	
M-7	3900	3142	169	24.0	14.0	5.0	13,728	5.6	62	--	--	
M-7	3900	4115	212	28.0	18.0	5.0	16,614	6.4	72	--	30' Bridge	
L-1	3300	587	42	13.0	3.0	5.0	4884	2.4	32	--	--	
Total-7	18,000						58,441	23.8				27,815.00
M-8	4500	1185	74	16.0	6.0	5.0	9180	4.1	40	--	--	
M-8	4800	1606	95	18.0	8.0	5.0	11,568	5.1	46	--	15' Bridge	
M-8	4300	1781	106	19.0	9.0	5.0	11,137	--	49	--	--	
Total-8	13,600						31,885	9.2				15,850.00
M-9	6500	1750	23	13.0	3.0	5.0	9620	4.8	32	--	--	
M-9	3700	2804	35	15.0	5.0	5.0	6845	3.2	38		15' Bridge	
M-9	4200	3448	41	16.0	6.0	5.0	8568	3.9	40	--	--	
M-9	4200	4268	49	17.0	7.0	5.0	9324	4.1	43	--	--	
M-9	4500	5814	64	19.0	9.0	5.0	11,655	5.0	48	--	30' Bridge	
M-9	3100	6210	68	20.0	10.0	5.0	8618	3.6	51	--	--	
M-9	3200	7390	79	24.0	14.0	5.0	11,264	4.6	62	--	--	
M-9	7000	13,518	131	32.0	22.0	5.0	35,000	13.3	83	--	--	
M-9	6300	14,351	137	32.0	22.0	5.0	31,500	12.0	83	--	--	
M-9	5200	14,689	138	32.0	22.0	5.0	26,000	9.9	83	--	--	
M-9	7700	31,310	264	55.0	45.0	5.0	71,302	25.5	144	--	--	
M-9	4600	32,420	274	55.0	45.0	5.0	42,596	15.2	144	--	--	
M-9	5000	34,393	285	60.0	50.0	5.0	50,950	18.0	157	--	--	

ENGINEERING AND DESIGN DATA
Area 12-Caw Caw Swamp

CANAL No. (1)	LENGTH Ft. (2)	WATERSHED Ac. (3)	DISCHARGE c.f.s. (4)	CHANNEL DIMENSIONS TOP WIDTH Ft. (5)	BOTTOM WIDTH Ft. (6)	AVERAGE DEPTH Ft. (7)	EXCAVATION Cu. Yds. (8)	RT. OF WAY CLEARING Ac. (9)	REQUIRED RT. OF WAY WIDTH Ft. (10)	CULVERTS LOWERING Length & Size (11)	CULVERTS & BRIDGES - NEW Length & Size (12)	TOTAL ESTIMATED COST Dollars (13)
M-9	5000	35,704	291	60.0	50.0	5.0	50,950	18.0	157	--	--	
M-9	5600	36,224	294	60.0	50.0	5.0	57,064	--	157	--	--	
L-1	8000	869	13	13.0	3.0	5.0	11,840	5.9	32	--	--	
L-2	5600	212	17	13.0	3.0	5.0	8288	4.1	32	--	40' - 48"	
L-2	5500	720	50	13.0	3.0	5.0	8140	4.0	32	--	15' Bridge	
L-2	2100	874	58	14.0	4.0	5.0	3507	1.7	35	--	--	
L-2	4500	1877	111	17.0	7.0	5.0	9990	4.4	43	--	--	
L-3	2200	196	16	13.0	3.0	5.0	3256	1.6	32	--	40' - 48"	
L-3	4400	504	37	13.0	3.0	5.0	6512	3.2	32	--	40' - 66"	
L-3	2900	757	52	13.0	3.0	5.0	4292	2.1	32	--	--	
L-4	2600	7489	77	22.0	12.0	5.0	8190	3.3	56			
L-4	3200	8249	86	24.0	14.0	5.0	11,264	4.6	62	--	--	
L-4	3300	10,085	101	28.0	18.0	5.0	14,058	5.5	72	--	--	
L-4	2500	11,575	114	28.0	18.0	5.0	10,650	4.1	72	--	30' Bridge	
L-4	5600	12,431	120	30.0	20.0	5.0	25,928	10.0	78	--	--	
L-4	3900	14,004	133	32.0	22.0	5.0	19,500	7.4	83	--	--	
L-4	6000	15,103	142	34.0	24.0	5.0	32,320	12.1	88			
L-5	6600	853	13	13.0	3.0	5.0	9768	4.8	32	--	15' Bridge	
L-5	4900	1177	17	13.0	3.0	5.0	7252	3.6	32	--	--	
L-6	3100	478	8	13.0	3.0	5.0	4588	2.2	32	--	40' - 60"	
L-6	6000	966	15	13.0	3.0	5.0	8880	4.4	32	--	--	
L-7	4600	959	15	13.0	3.0	5.0	6808	3.4	32	--	15' Bridge	
L-7	5100	1387	20	13.0	3.0	5.0	7548	3.7	32	--	--	
L-8	5200	570	9	13.0	3.0	5.0	7696	3.8	32	--	--	
L-8	4600	874	13	13.0	3.0	5.0	6808	3.4	32	--	--	
L-9	1600	94	2	13.0	3.0	5.0	2368	1.2	32	--	--	
L-9	6600	1276	18	13.0	3.0	5.0	9768	4.8	32	--	--	
L-9	6000	3863	46	16.0	6.0	5.0	12,240	5.5	40	--	--	
L-9	7900	4808	55	17.0	7.0	5.0	17,538	7.8	43	--	--	
L-10	2000	1097	16	13.0	3.0	5.0	2960	1.5	32	--	15' Bridge	
L-10	7000	1628	22	13.0	3.0	5.0	10,360	5.1	32	--	--	
L-11	3700	253	5	13.0	3.0	5.0	5476	2.7	32	--	--	
L-12	6100	656	10	13.0	3.0	5.0	9028	4.5	32	--	40' - 42"	
L-13	2400	403	7	13.0	3.0	5.0	3552	1.8	32	--	40' - 60"	
L-13	3700	645	10	13.0	3.0	5.0	5476	2.7	32	--	--	
L-14	7100	541	9	13.0	3.0	5.0	10,508	5.2	32	--	--	
Total-9	232,300						757,613	287.2				325,643.00
Area 12 Grand Total	328,700						967,791	375.7				431,483.00

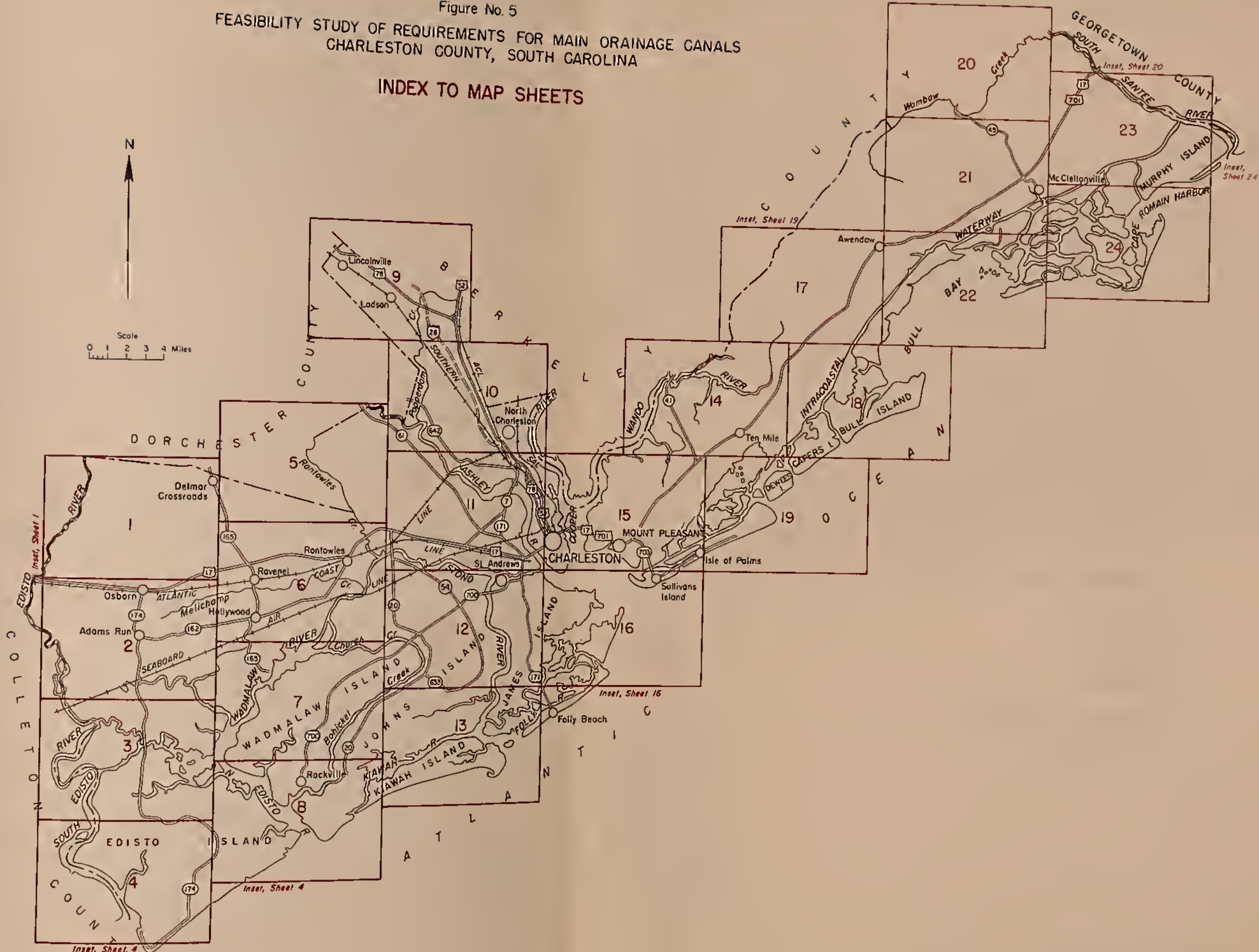
SOIL LEGEND

SYMBOL	SOIL GROUP
1	Well Drained and Moderately Well Drained Soils with Loamy Sand to Sand Subsoils.
2	Somewhat Poorly Drained to Poorly Drained Soils with Sand to Loamy Sand Subsoils.
3	Poorly Drained and Very Poorly Drained Soils with Sand Subsoils and Organic Hardpan Soils.
4	Well Drained and Moderately Well Drained Soils with Sandy Loam to Sandy Clay Loam Subsoils.
5	Somewhat Poorly Drained to Poorly Drained Soils with Sandy Loam to Sandy Clay Loam Subsoils.
6	Poorly Drained and Very Poorly Drained Soils with Plastic Sandy Clay Loam to Sandy Clay Subsoils.
7	Poorly Drained and Very Poorly Drained Alluvial and Terrace Soils with Sandy Clay to Silty Clay Subsoils.
	Miscellaneous Land Types
8	Tidal Marsh
9	Fresh Water Marsh
10	Dune Land
11	Swamp
12	Made Land
13	Mined areas - phosphate
14	Coastal beach

Figure No. 5

FEASIBILITY STUDY OF REQUIREMENTS FOR MAIN DRAINAGE CANALS CHARLESTON COUNTY, SOUTH CAROLINA

INDEX TO MAP SHEETS



CONVENTIONAL SIGNS

Primary Road System

Interstate Highway

Federal Highway

State Highway

School

Church

Gravel Pit

County Line

Planning Unit Boundary and Number

Watershed Boundary

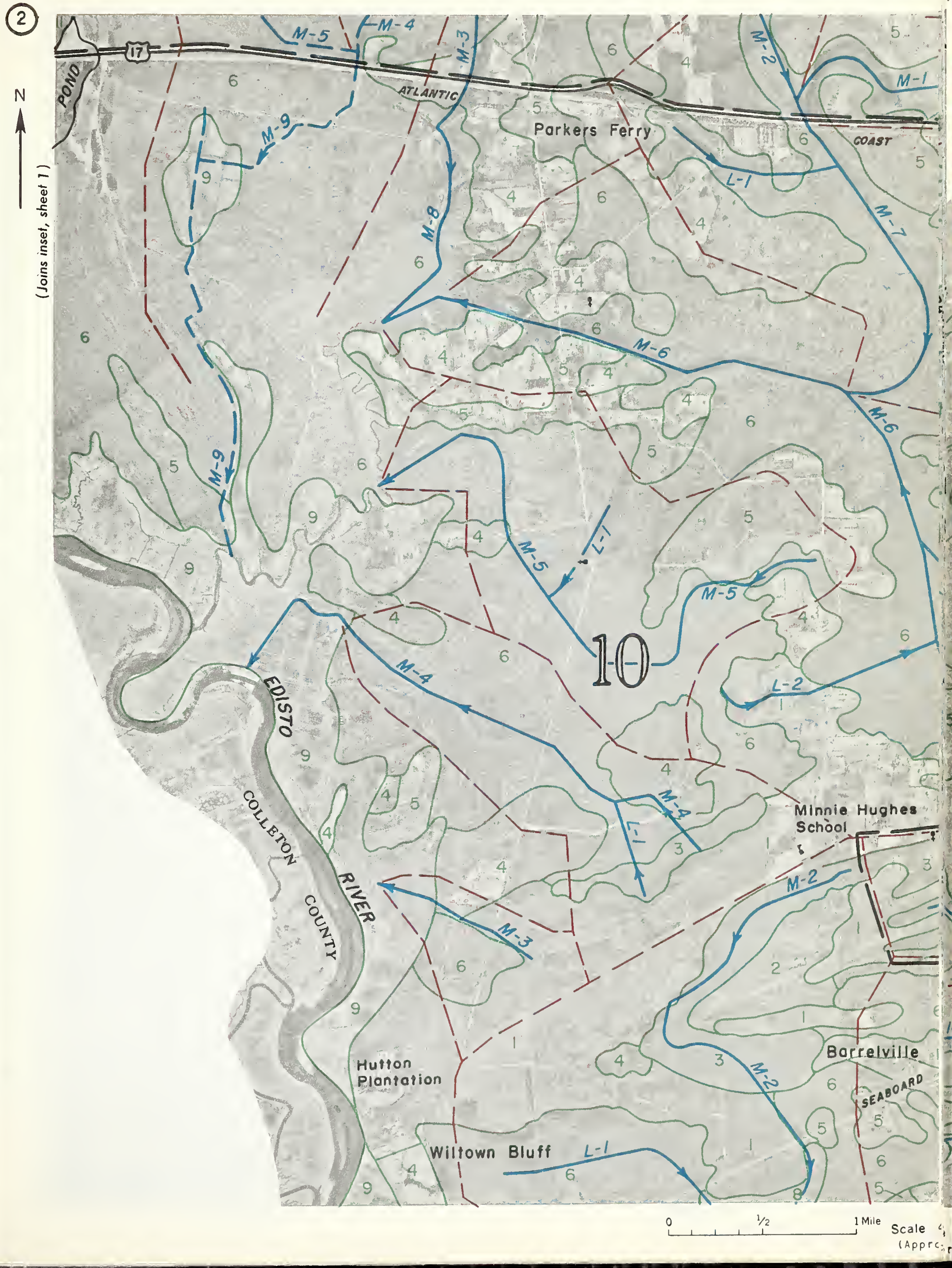
Main

Lateral

Indicates existing canals or natural drainage in swamp

Runoff Storage Area

Reconnaissance Soil Boundary and Soil Group Number



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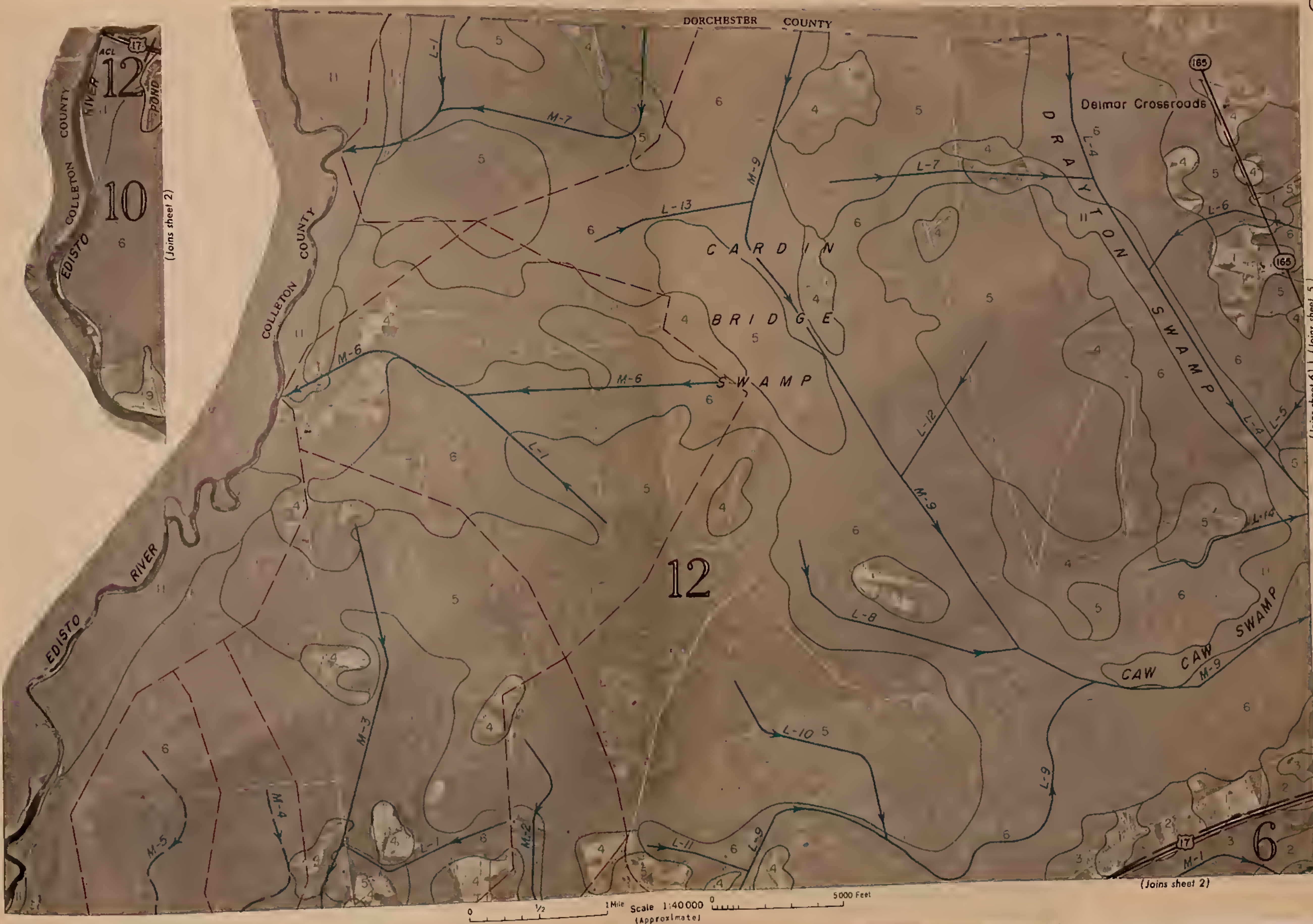
(Joins inset, sheet 1)
POND
17
ATLANTIC
COAST
Parkers Ferry
M-1
M-2
M-3
M-4
M-5
M-6
M-7
M-8
M-9
L-1
L-2
10
EDISTO
RIVER
COLLETON
COUNTY
Minnie Hughes
School
Hutton
Plantation
Barrelville
SEABOARD
Wiltown Bluff
0
1/2
1 Mile
Scale

SOIL LEGEND

SYMBOL	SOIL GROUP
1	Well Drained and Moderately Well Drained Soils with Loamy Sand to Sand Subsoils.
2	Somewhat Poorly Drained to Poorly Drained Soils with Sand to Loamy Sand Subsoils.
3	Poorly Drained and Very Poorly Drained Soils with Sand Subsoils and Organic Hardpan Soils.
4	Well Drained and Moderately Well Drained Soils with Sandy Loam to Sandy Clay Loam Subsoils.
5	Somewhat Poorly Drained to Poorly Drained Soils with Sandy Loam to Sandy Clay Loam Subsoils.
6	Poorly Drained and Very Poorly Drained Soils with Plastic Sandy Clay Loam to Sandy Clay Subsoils.
7	Poorly Drained and Very Poorly Drained Alluvial and Terrace Soils with Sandy Clay to Silty Clay Subsoils.
	Miscellaneous Land Types
8	Tidal Marsh
9	Fresh Water Marsh
10	Dune Land
11	Swamp
12	Made Land
13	Mined areas - phosphate
14	Coastal beach

CONVENTIONAL SIGNS

	Primary Road System
26	Interstate Highway
701	Federal Highway
700	State Highway
	School
	Church
	Gravel Pit
	County Line
2	Planning Unit Boundary and Number
	Watershed Boundary
M-1	Main
L-1	Lateral
	Indicates existing canals or natural drainage in swamp
A	Runoff Storage Area
2	Reconnaissance Soil Boundary and Soil Group Number



o-partment of Agriculture, Columbia, South Carolina. This map was compiled as an uncontrolled mosaic from aerial photographs flown in 1962. Aerial photographs used by permission of the County Manager, Charleston County, South Carolina, and E. L. Wilkins Associates, Valuation Engineers, Charleston, South Carolina. Maps were prepared and surveys executed in 1964.

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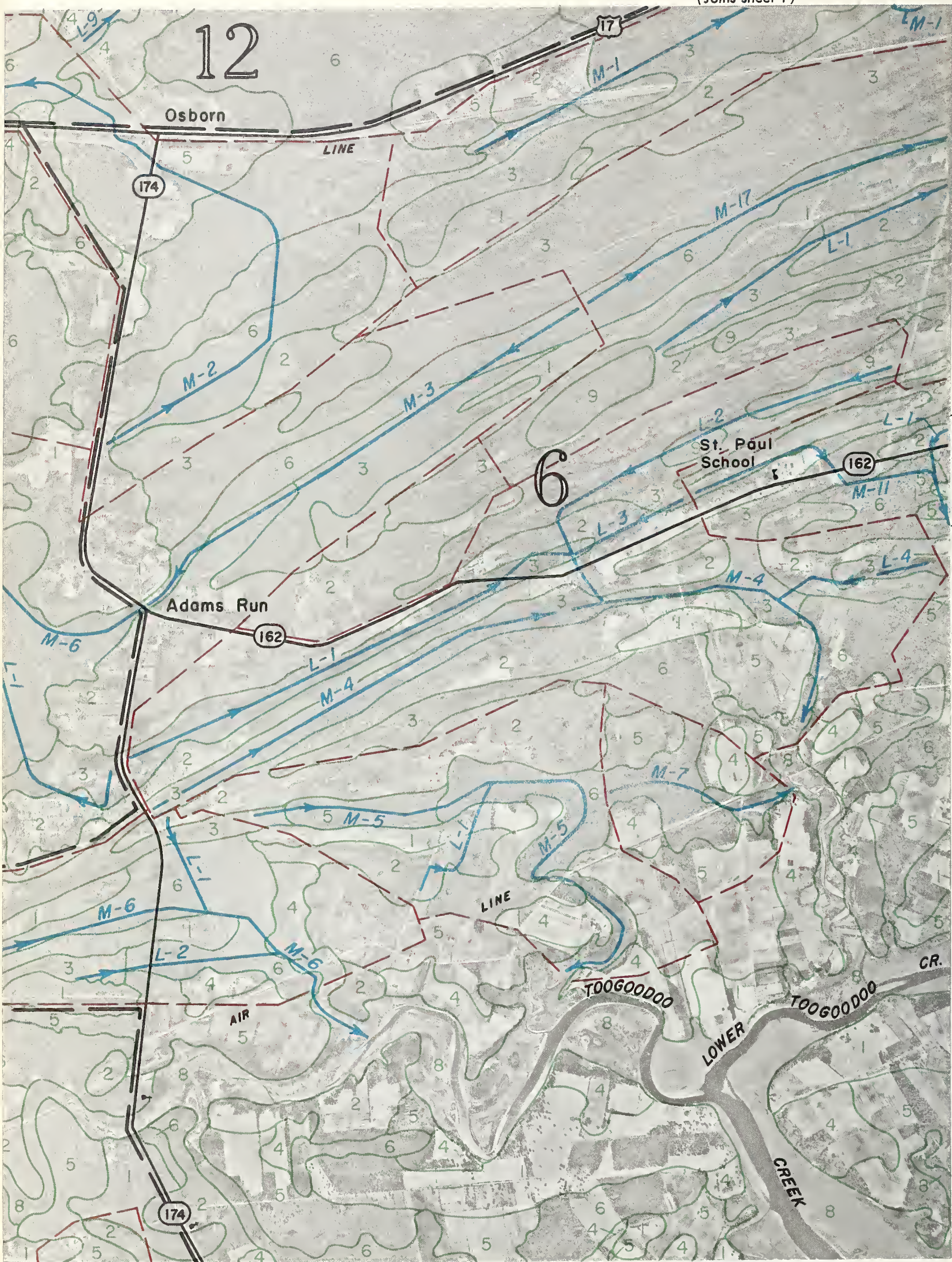

(Joins sheet 6) | (Joins sheet 7)

(Joins sheet 3)

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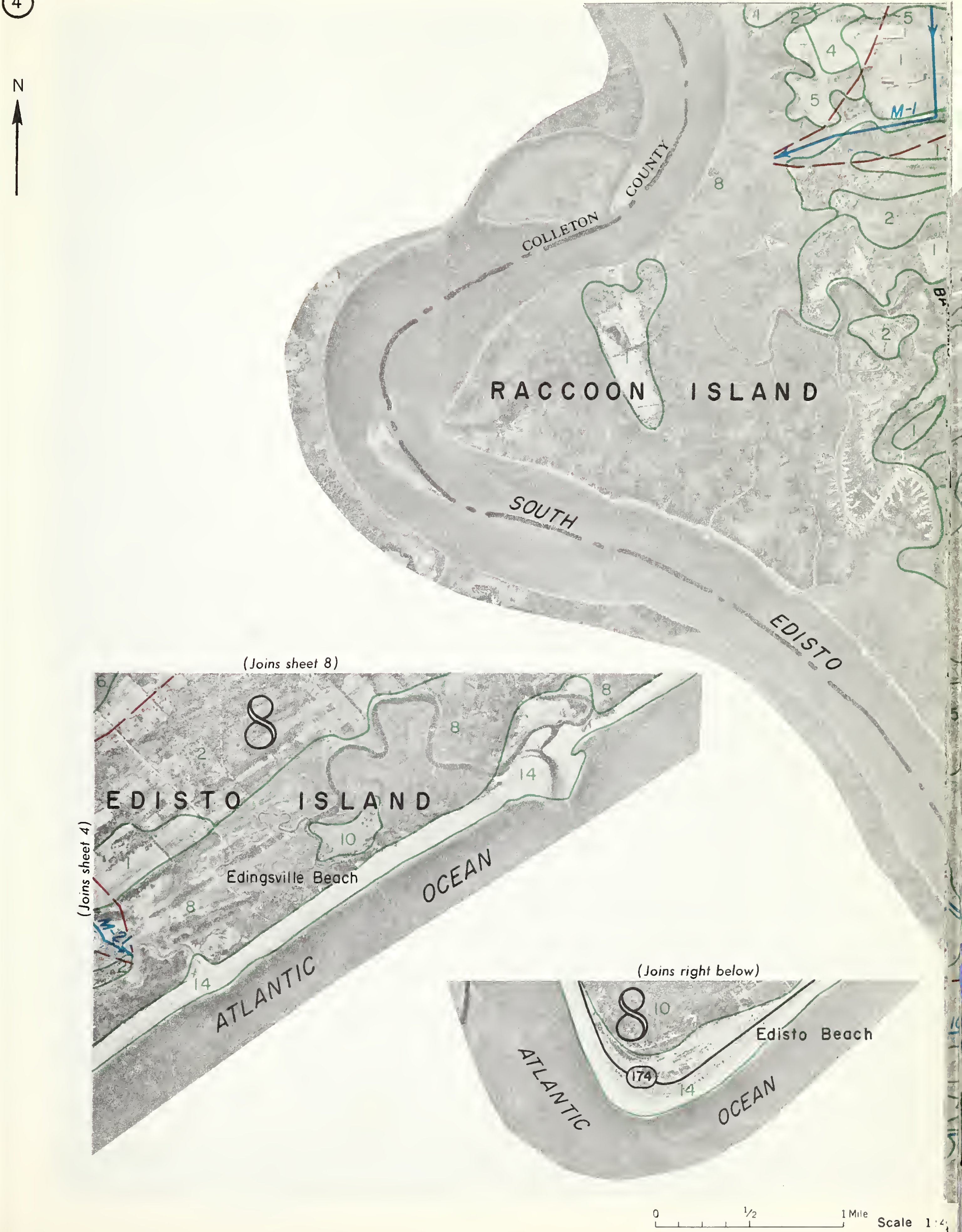

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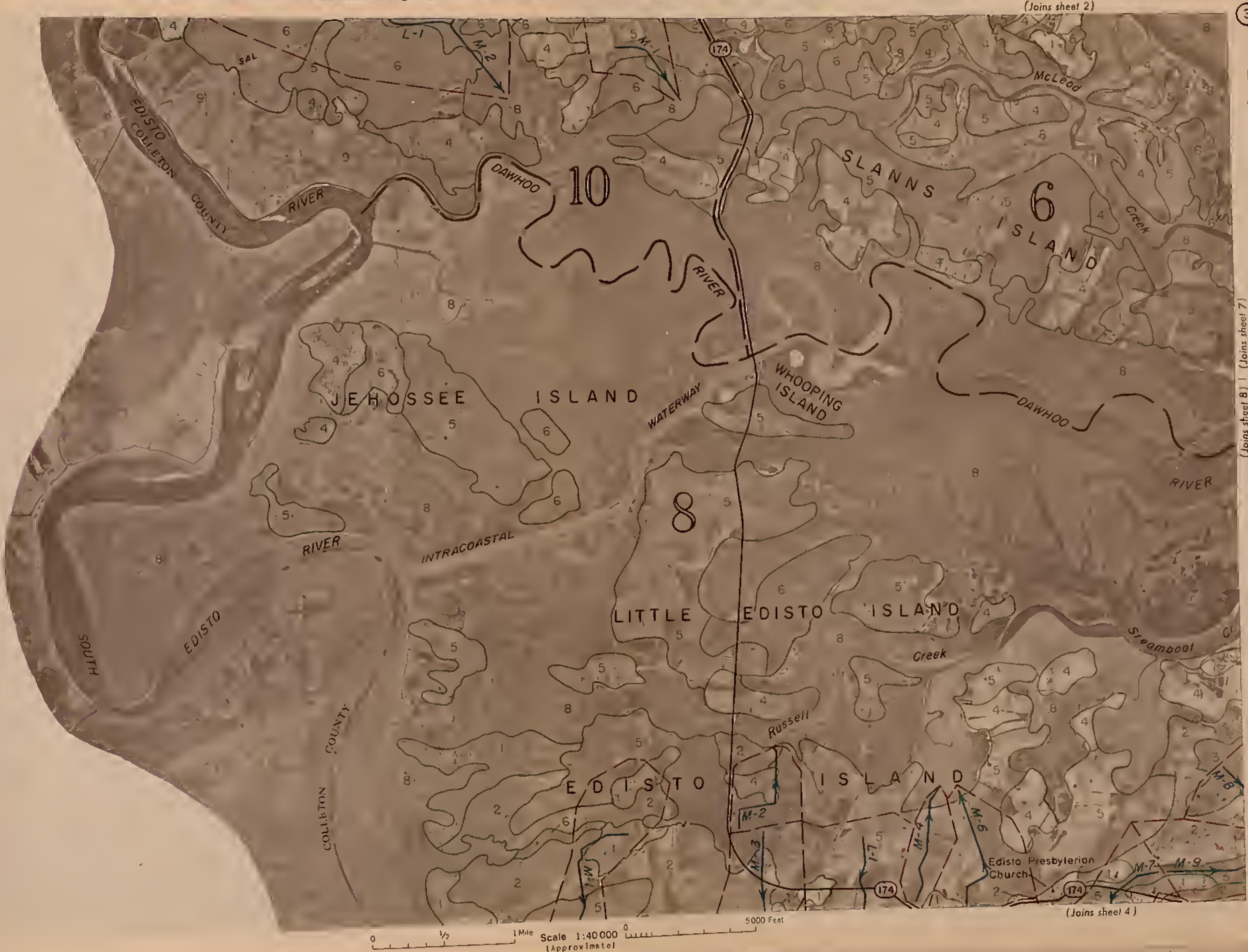
FEASIBILITY STUDY OF REQUIREMENTS FOR MAIN DRAINAGE CANALS IN CHARLESTON COUNTY, SOUTH CAROLINA

FEASIBILITY STUDY OF REQUIREMENTS FOR MAIN DRAINAGE CANALS IN CHARLESTON COUNTY, SOUTH CAROLINA



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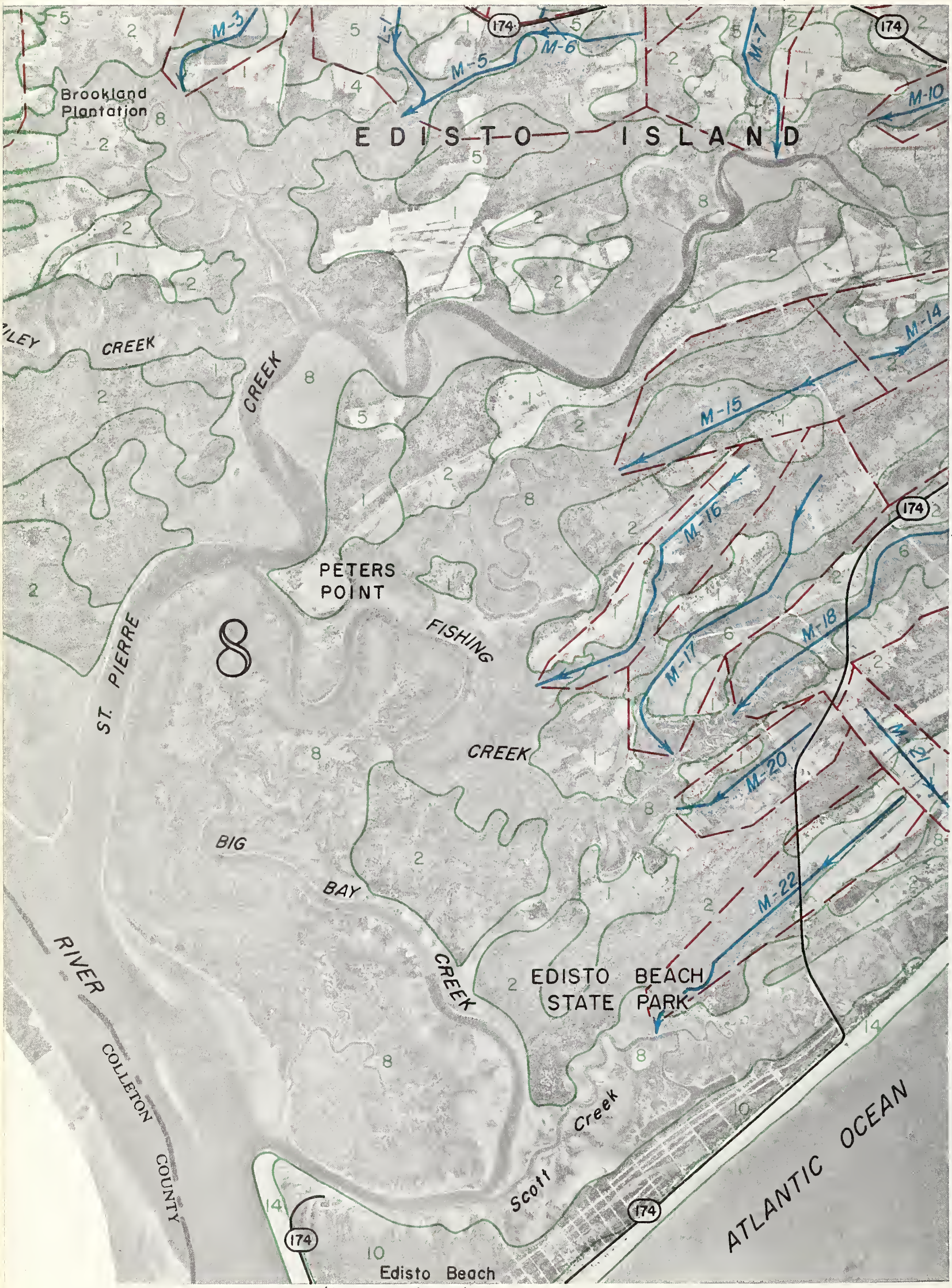

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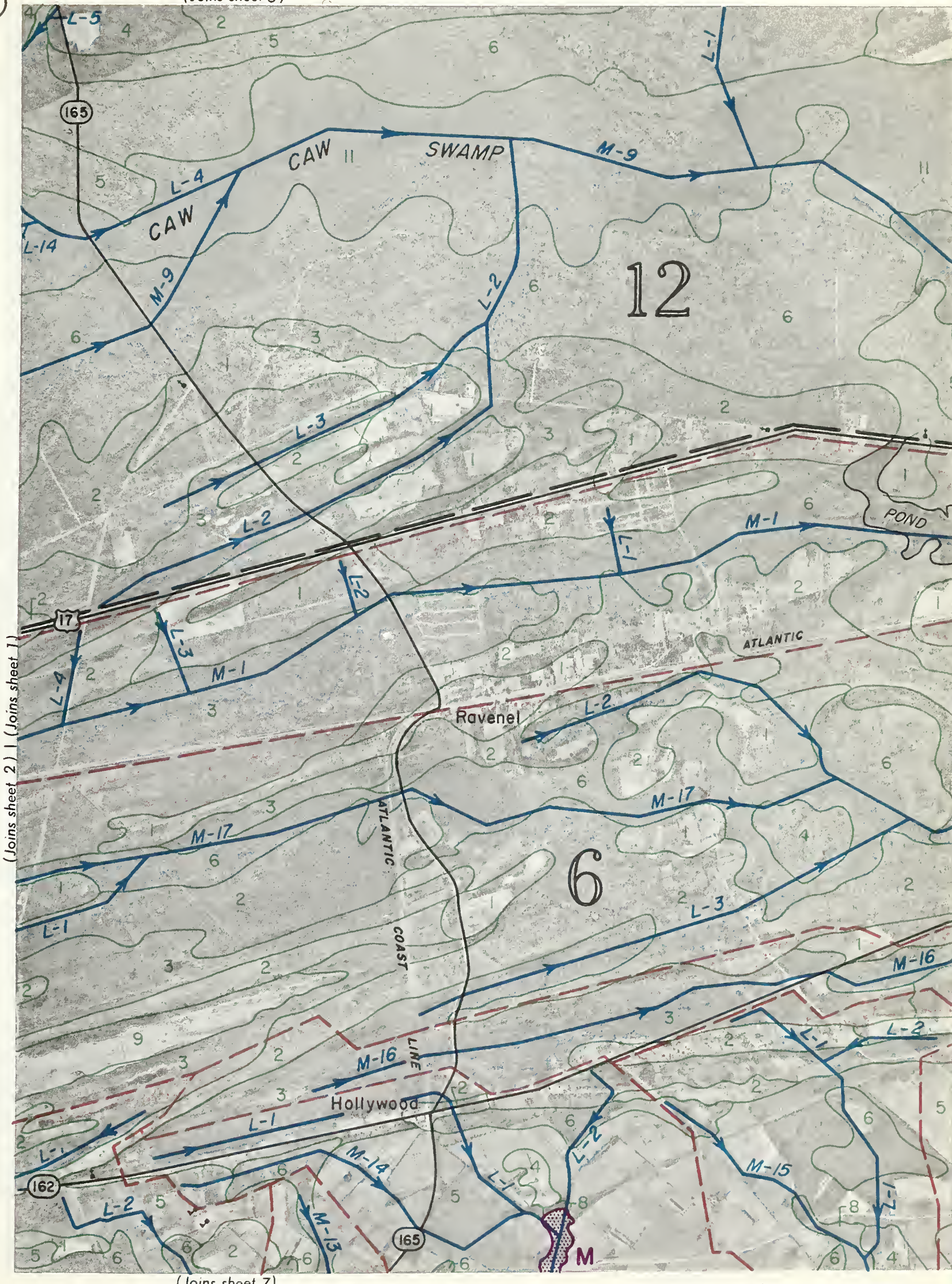
6

(Joins sheet 5)



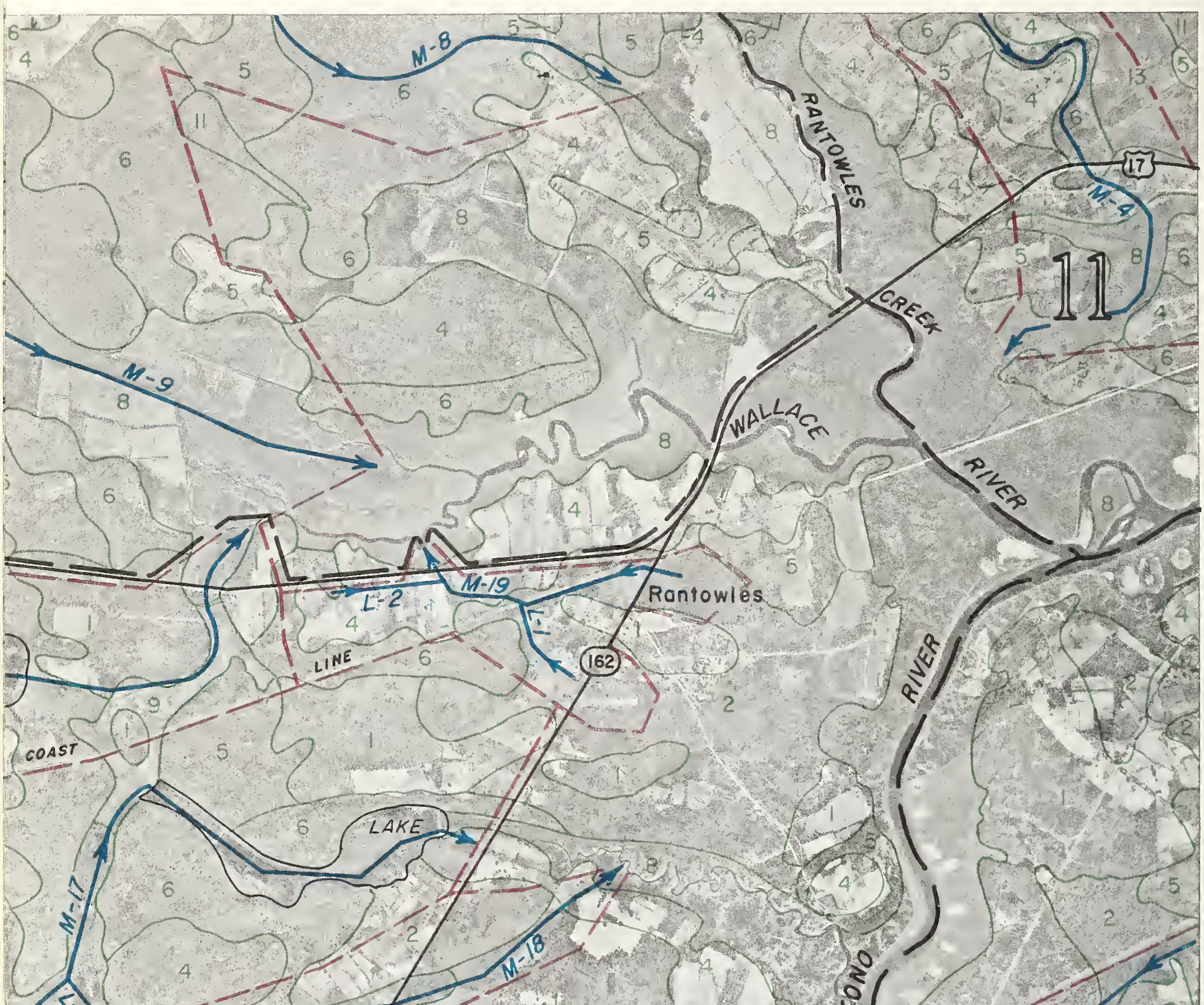
(Joins sheet 7)

0 ½ 1 Mile

Scale (Appro...

FEASIBILITY STUDY OF REQUIREMENTS FOR MAIN DRAINAGE CANALS IN CHARLESTON COUNTY, SOUTH CAROLINA

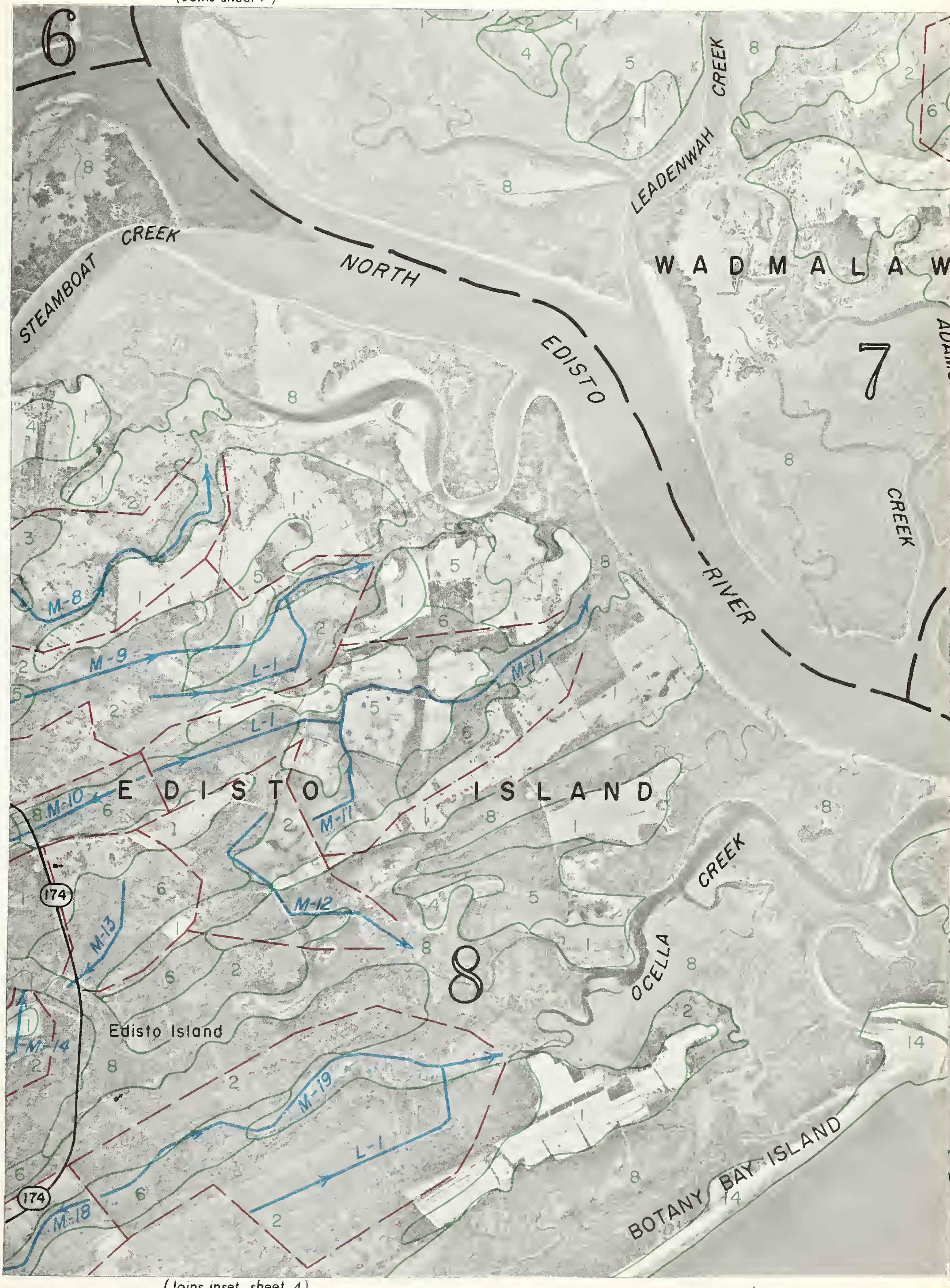
FEASIBILITY STUDY OF REQUIREMENTS FOR MAIN DRAINAGE CANALS IN CHARLESTON COUNTY, SOUTH CAROLINA



1:40 000 (approximate) 0 5000 Feet

Council and the Charleston Soil Conservation District. For information regarding the complete feasibility study report, write the Soil Conservation Service, U. S.
Department of Agriculture, Columbia, South Carolina. This map was compiled as an uncontrolled mosaic from aerial photographs flown in 1961. Aerial photographs used by
permission of the County Manager, Charleston County, South Carolina, and E. T. Wilkins Associates, Valuation Engineers, Charleston, South Carolina. Maps were prepared

(Joins sheet 7)



(Joins inset, sheet 4)

0 ½ 1 Mile
Scale
(Appro

Fold-out Placeholder

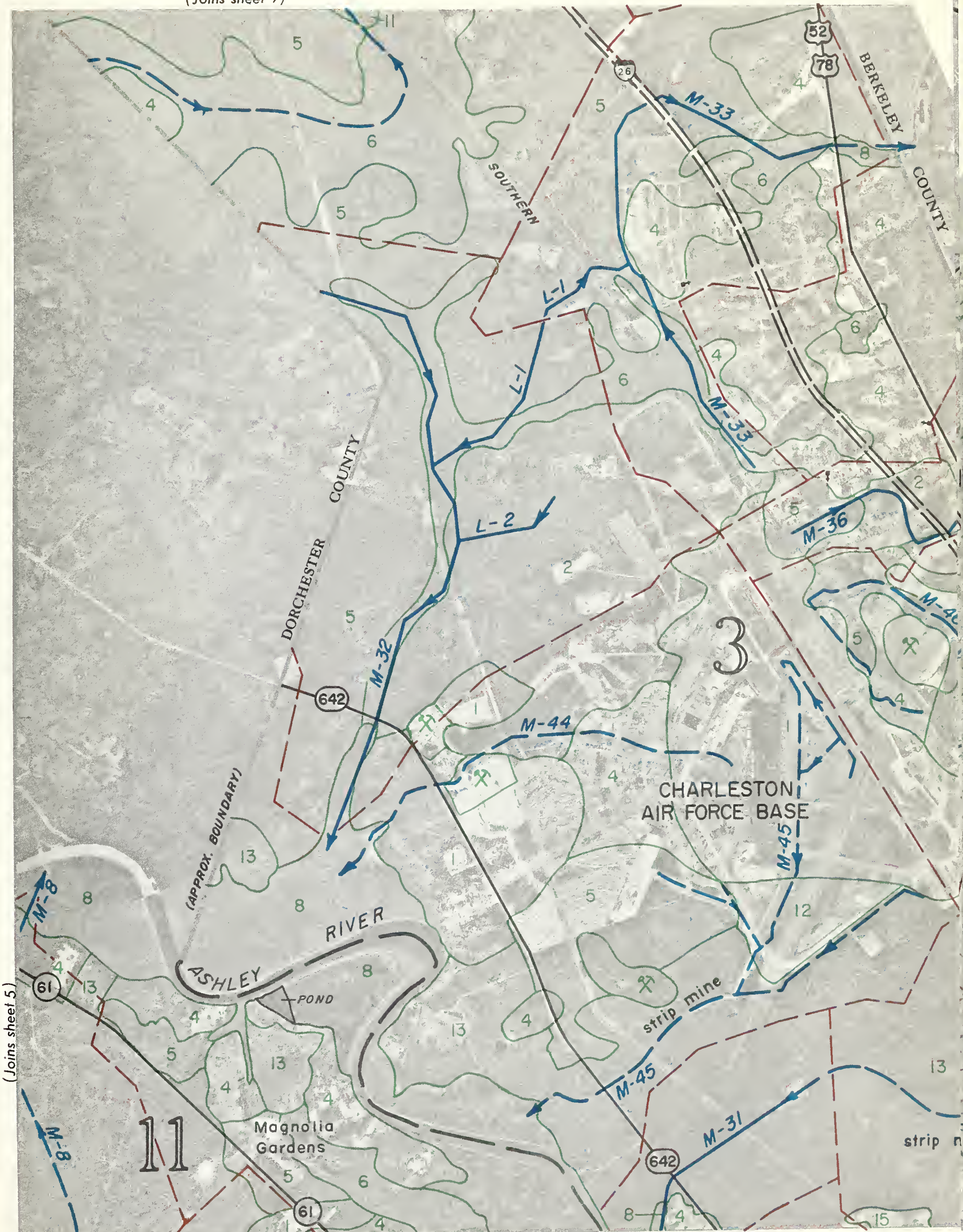
This fold-out is being digitized, and will be inserted at a future date.

1:40000 (approximate) 0 5000 Feet

10

Council and the Charleston Soil Conservation District. For information regarding the complete feasibility study report, write the Soil Conservation Service, U. S.

(Joins sheet 9)



(Joins sheet 11)

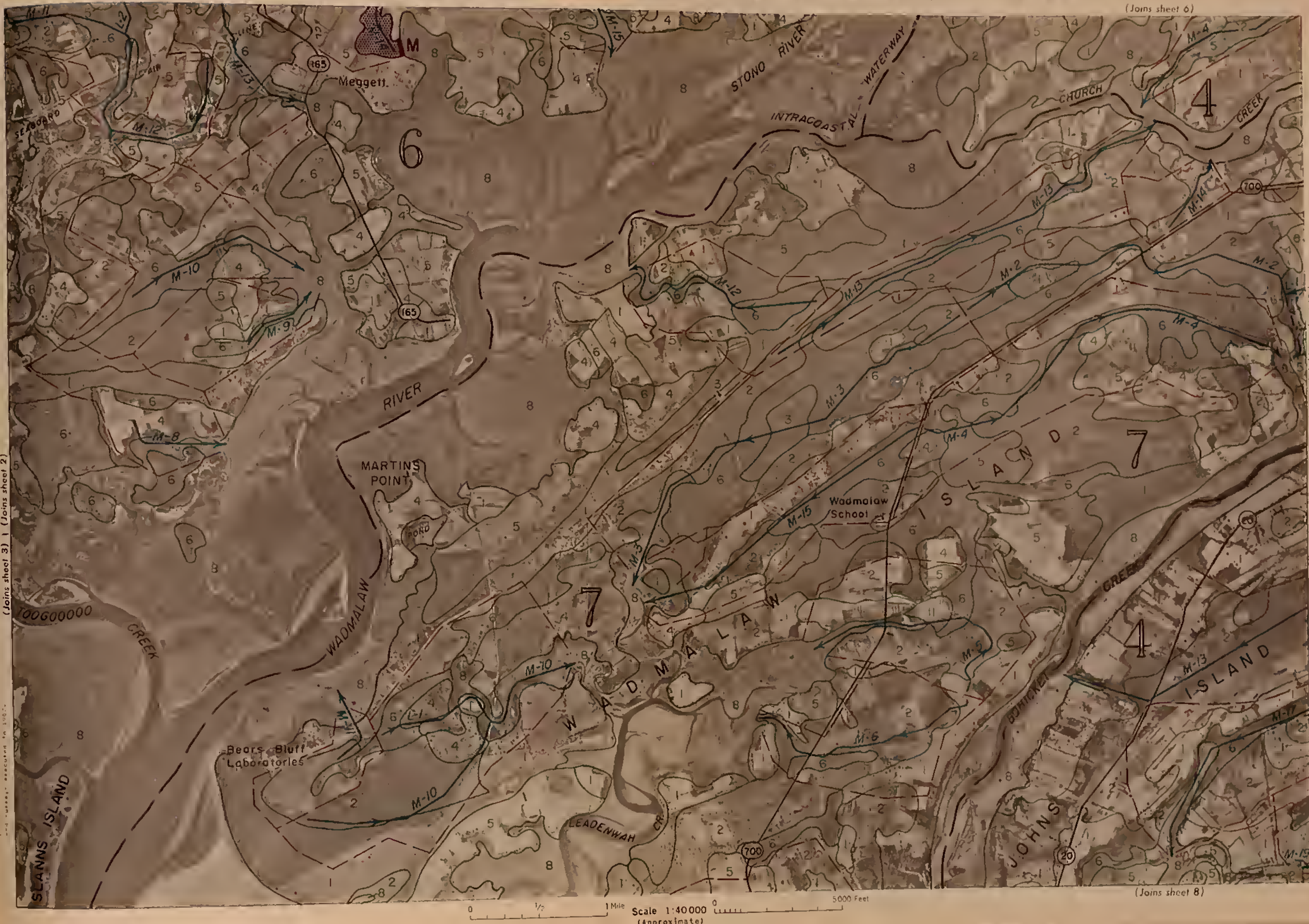
0 1/2 1 Mile

Scale
(Appro

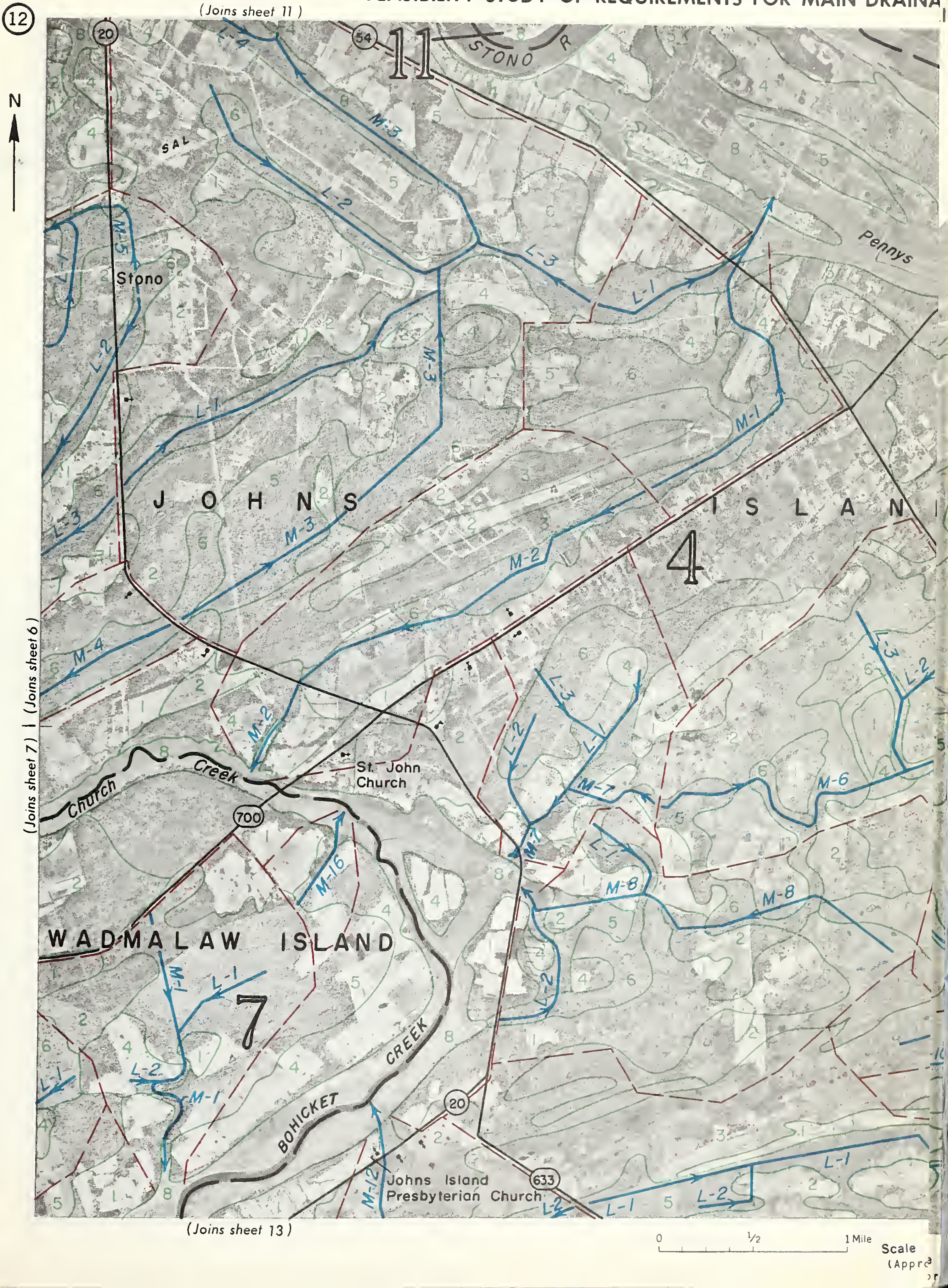
6


(Joins sheet 5)
N
CAW CAW SWAMP
M-9
M-8
M-1
M-17
M-16
M-18
M-19
M-15
M-14
M-13
M-5
M-4
L-1
L-2
L-3
L-4
L-5
L-14
12
6
4
11
RANTOWLES CREEK
WALLACE RIVER
Rantowles
POND
ATLANTIC COAST LINE
LAKE
STONO RIVER
Ravenel
SEABOARD AIR LINE
INTRACOASTAL WATERWAY
JOHNS ISLAND
Hollywood
M
(Joins sheet 2)
(Joins sheet 1)
(Joins sheet 12)
(Joins sheet 11)
(Joins sheet 7)
Scale 1:40000 (Approximate)
1/2
1 Mile
5000 Feet

FEASIBILITY STUDY OF REQUIREMENTS FOR MAIN DRAINAGE CANALS IN CHARLESTON COUNTY, SOUTH CAROLINA



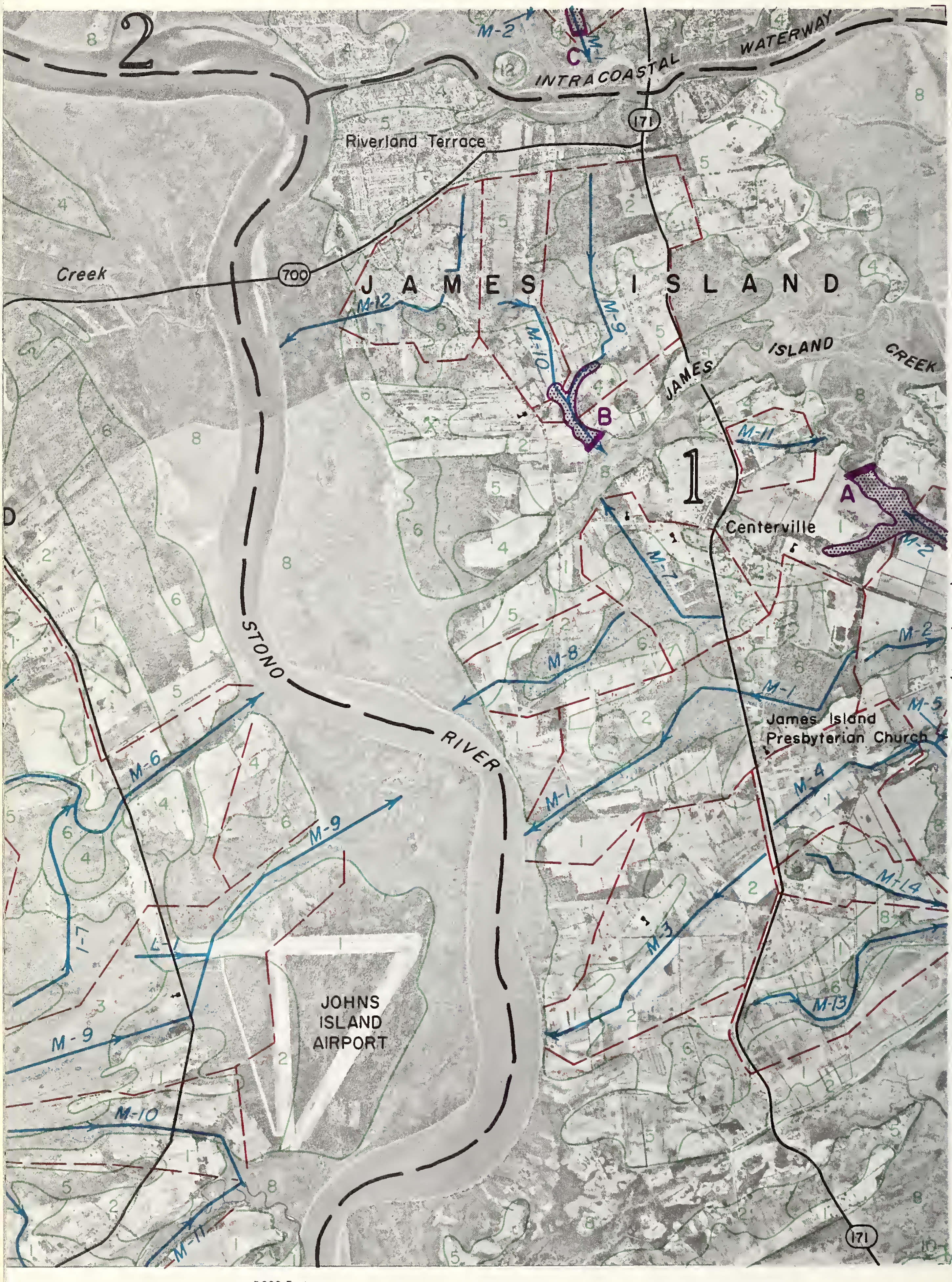
AGE CANALS IN CHARLESTON COUNTY, SOUTH CAROLINA



Charleston County ... sponsorship of the Charleston County Soil Conservation District. For information regarding the complete feasibility study report, write the Soil Conservation Service, U. S.

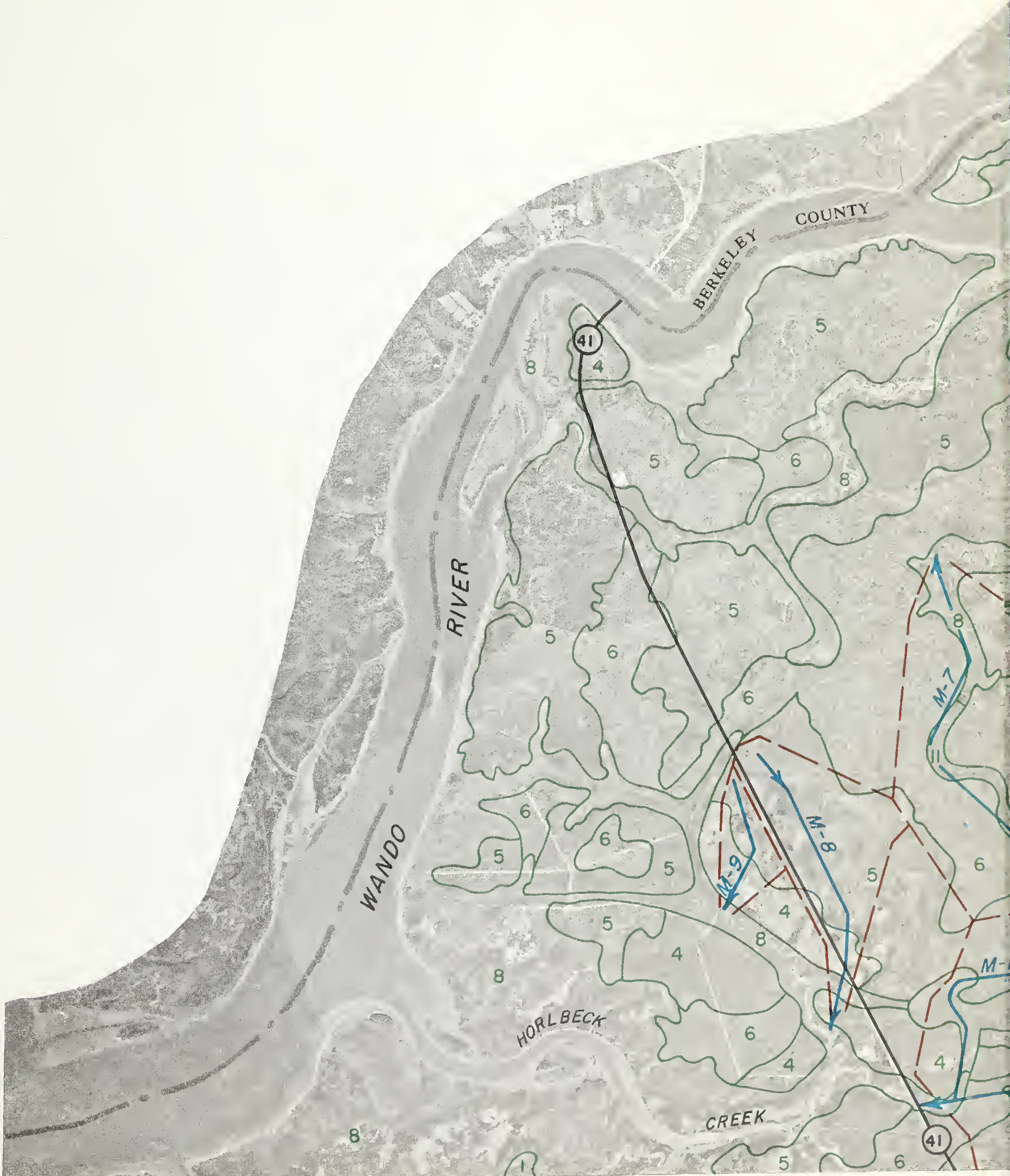

(Joins sheet 7)
6
7
8
4
WADMALAW ISLAND
JOHNS ISLAND
EDISTO ISLAND
SEABROOK ISLAND
KIAWAH ISLAND
BOTANY BAY ISLAND
NORTH EDISTO RIVER
STEAMBOAT CREEK
LEADENWAH CREEK
ADAMS CREEK
BOHICKET CREEK
KIAWAH RIVER
OCELLA CREEK
ATLANTIC OCEAN
Rockville
Edisto Island
700
20
174
(Joins sheet 13)
(Joins inset, sheet 4)
Scale 1:40 000 (Approximate)
5000 Feet
1 Mile


N
Lincolnville
Ladson
The Antlers
BERKELEY COUNTY
DORCHESTER COUNTY
Sawmill Branch
M-43
M-42
M-41
M-40
M-39
M-38
M-37
M-34
L-1
L-2
L-3
3
(Joins sheet 10)
Scale 1:40000
(Approximate)
0
1/2
1 Mile
5000 Feet



1:40 000 (approximate) 0 5000 Feet

FEASIBILITY STUDY OF REQUIREMENTS FOR MAIN DRAI

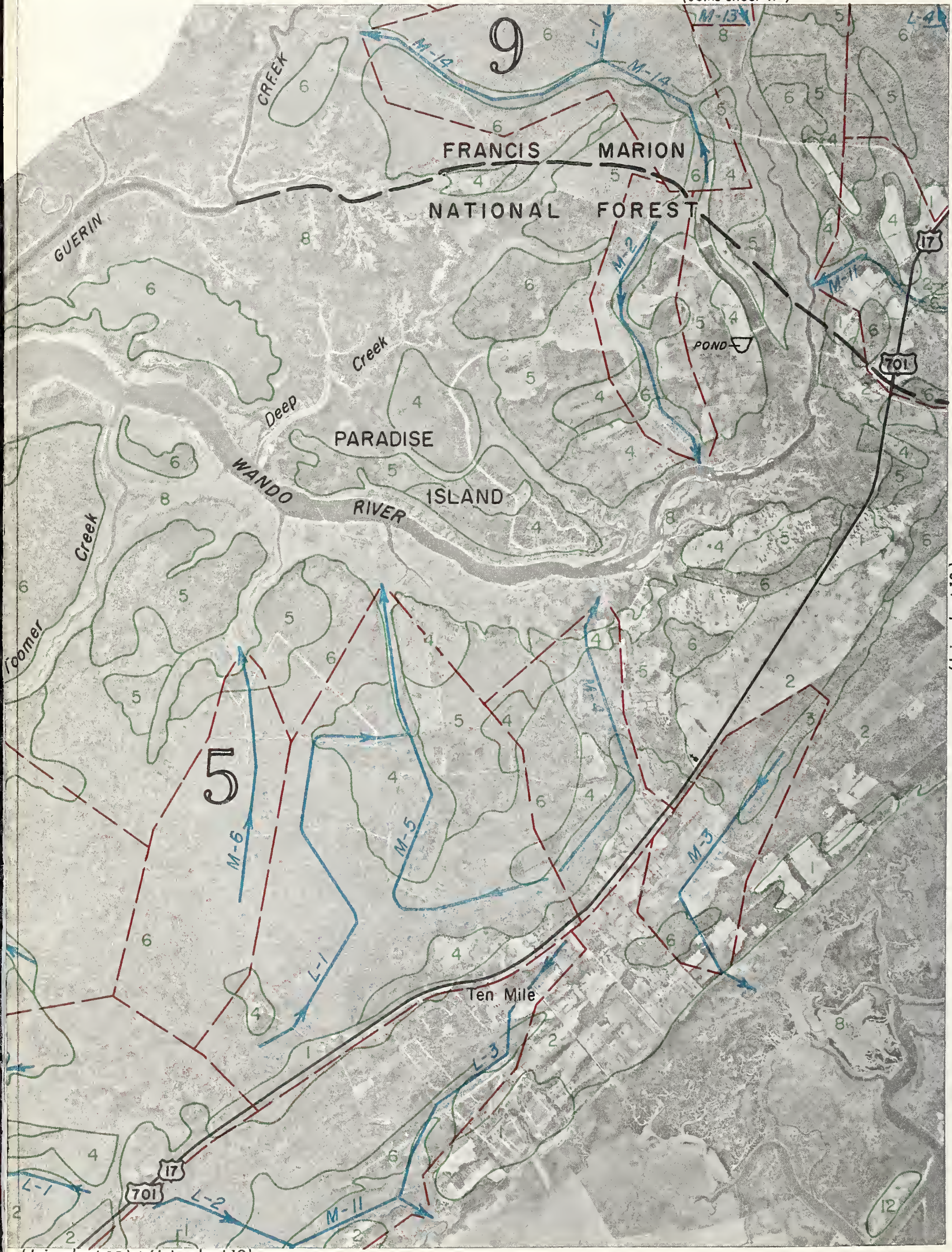


Council and the Charleston Soil Conservation District. For information regarding the complete feasibility study report, write the Soil Conservation Service, U. S. Department of Agriculture, Columbia, South Carolina. This map was compiled as an uncontrolled mosaic from aerial photographs flown in 1961. Aerial photographs used by ... of the County Manager, Charleston County, South Carolina, and E. T. Wilkins Associates, Valuation Engineers, Charleston, South Carolina. Maps were prepared

10
(Joins sheet 9)
N
BERKELEY COUNTY
ATLANTIC COAST LINE
SOUTHERN
DORCHESTER COUNTY
(APPROX. BOUNDARY)
M-33
M-36
M-46
M-32
M-44
M-45
M-16
M-18
M-5
M-17
M-6
M-14
M-13
M-12
M-11
M-10
M-9
M-31
M-8
L-1
L-2
3
CHARLESTON AIR FORCE BASE
ASHLEY RIVER
POND
strip mine
NORTH CHARLESTON
COOPER RIVER
BERKLEY COUNTY
Magnolia Gardens
11
I
J
K
(Joins sheet 5)
(Joins sheet 11)
Scale 1:40000 (Approximate)
0 1/2 1 Mile
0 5000 Feet

FEASIBILITY STUDY OF REQUIREMENTS FOR MAIN DRAINAGE CANALS IN CHARLESTON COUNTY, SOUTH CAROLINA

(Joins sheet 17)



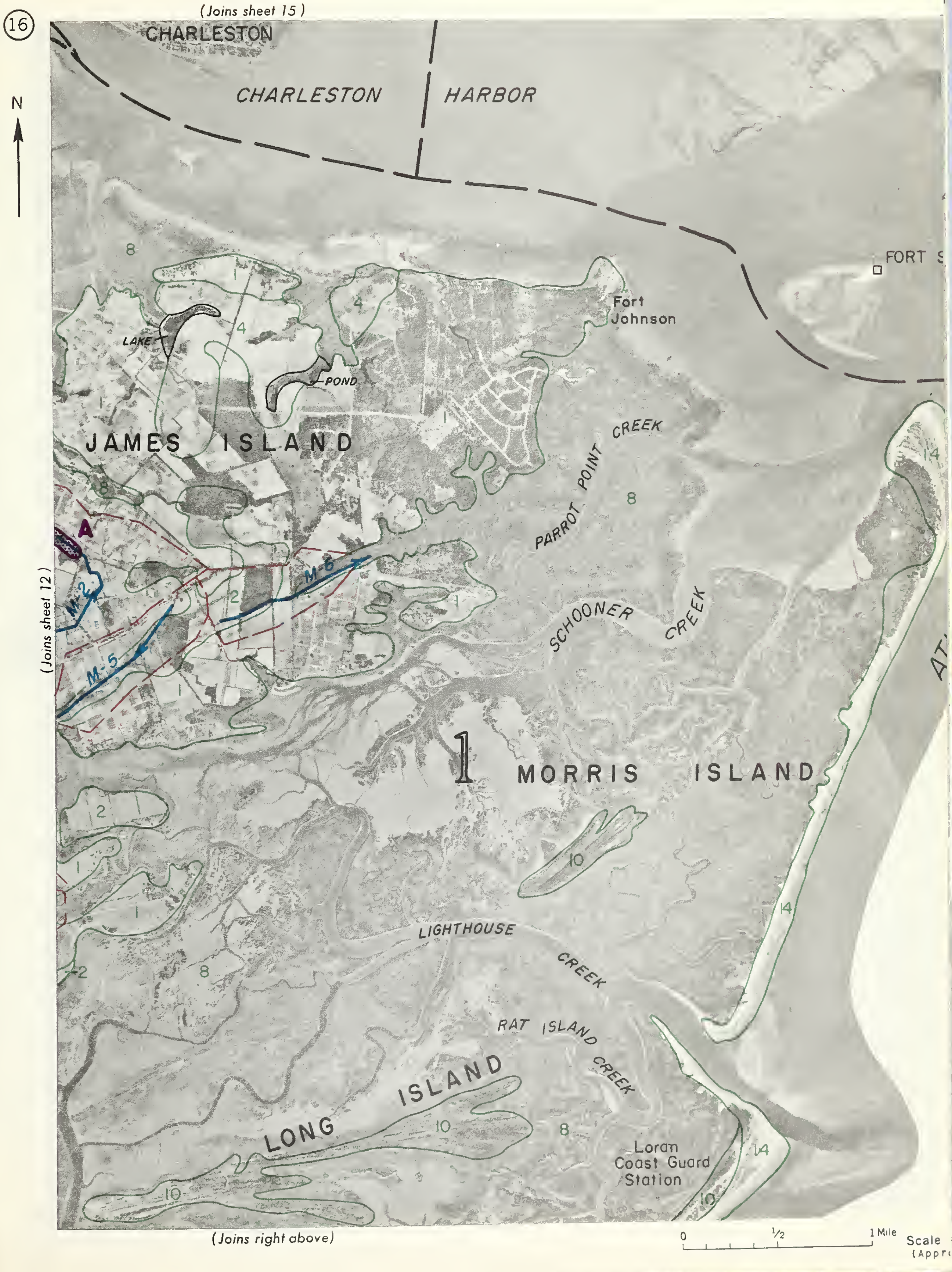
(Joins sheet 18)

(Joins sheet 15) | (Joins sheet 19)

1:40 000 0 5000 Feet

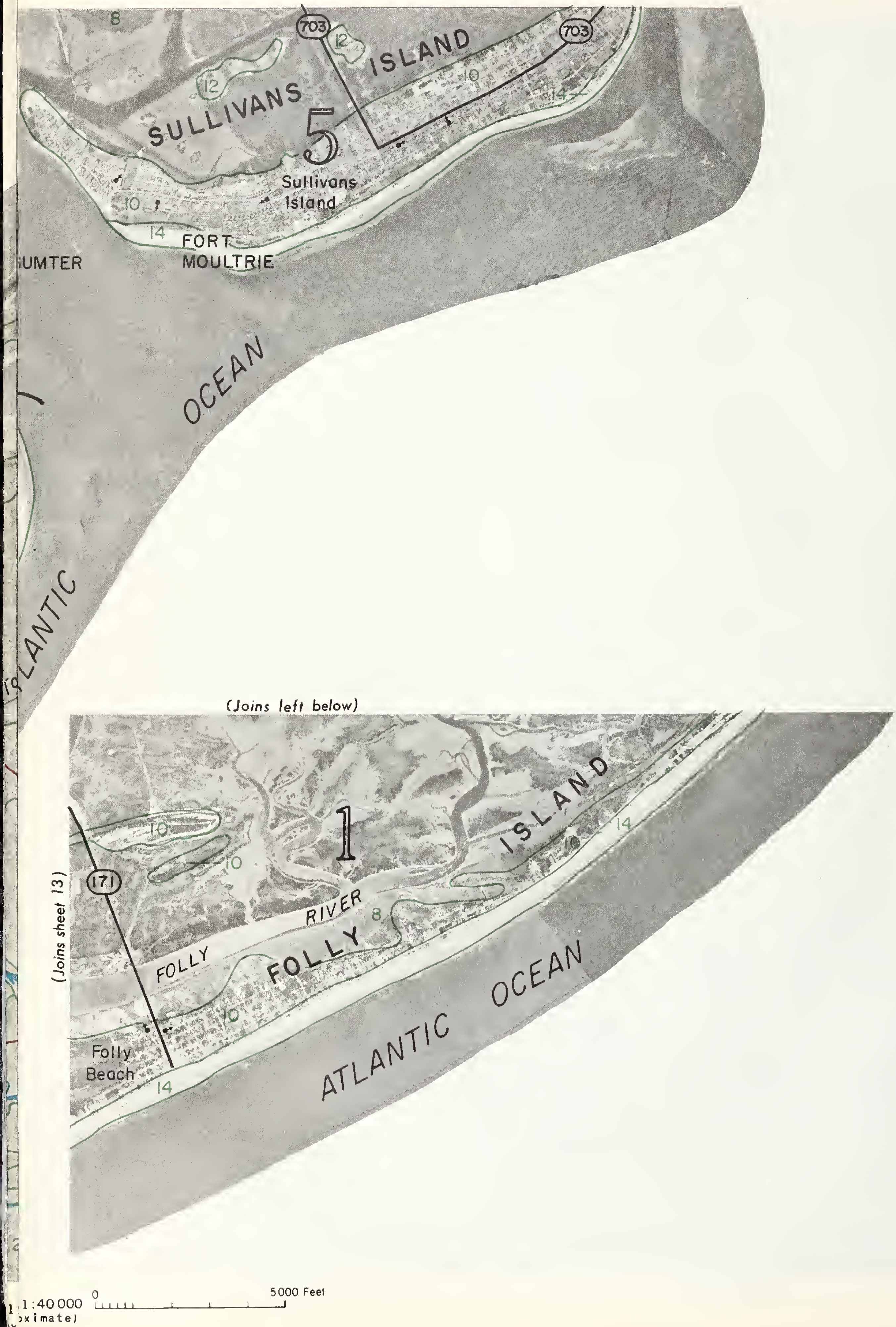
ximate)

... and the Charleston Soil Conservation District. — For information regarding the complete feasibility study report, write the Soil Conservation Service, U. S.




(Joins sheet 11)
N
STONO R
Riverland Terrace
INTRACOASTAL WATERWAY
Pennys Creek
Stono
JAMES ISLAND
JOHNS ISLAND
ISLAND CREEK
JAMES
Centerville
STONO RIVER
James Island Presbyterian Church
St. John Church
Church Creek
WADMALAW ISLAND
JOHNS ISLAND AIRPORT
BOHICKET CREEK
Johns Island Presbyterian Church
(Joins sheet 13)
(Joins sheet 6)
(Joins sheet 7)
(Joins sheet 16)
Scale 1:40000
(Approximate)
1 Mile
5000 Feet


(Joins sheet 12)
(Joins inset, sheet 16)
(Joins sheet 8) | (Joins sheet 7)
N
SOL LEGARE ISLAND
JOHNS ISLAND
KIAWAH ISLAND
FOLLY ISLAND
Mt. Zion School
BOHICKET CREEK
ABBAPOOLA
STONO RIVER
KIAWAH RIVER
CHAPLIN CREEK
BASS CREEK
ROBBINS CREEK
GREEN CREEK
FOLLY CREEK
FOLLY RIVER
POND
ATLANTIC OCEAN
L-1
L-2
M-11
M-12
M-13
M-14
M-15
M-16
M-17
M-18
M-19
Scale 1:40000 (Approximate)
0 1/2 1 Mile
0 5000 Feet


703
703
SULLIVANS
ISLAND
5
Sullivans
Island
FORT
MOULTRIE
UMTER
ATLANTIC
OCEAN
(Joins left below)
(Joins sheet 13)
171
1
FOLLY
ISLAND
FOLLY
RIVER
FOLLY
Folly
Beach
ATLANTIC
OCEAN
1:40 000
0
5000 Feet

(18)

(Joins sheet 17)

N

(Joins sheet 14)

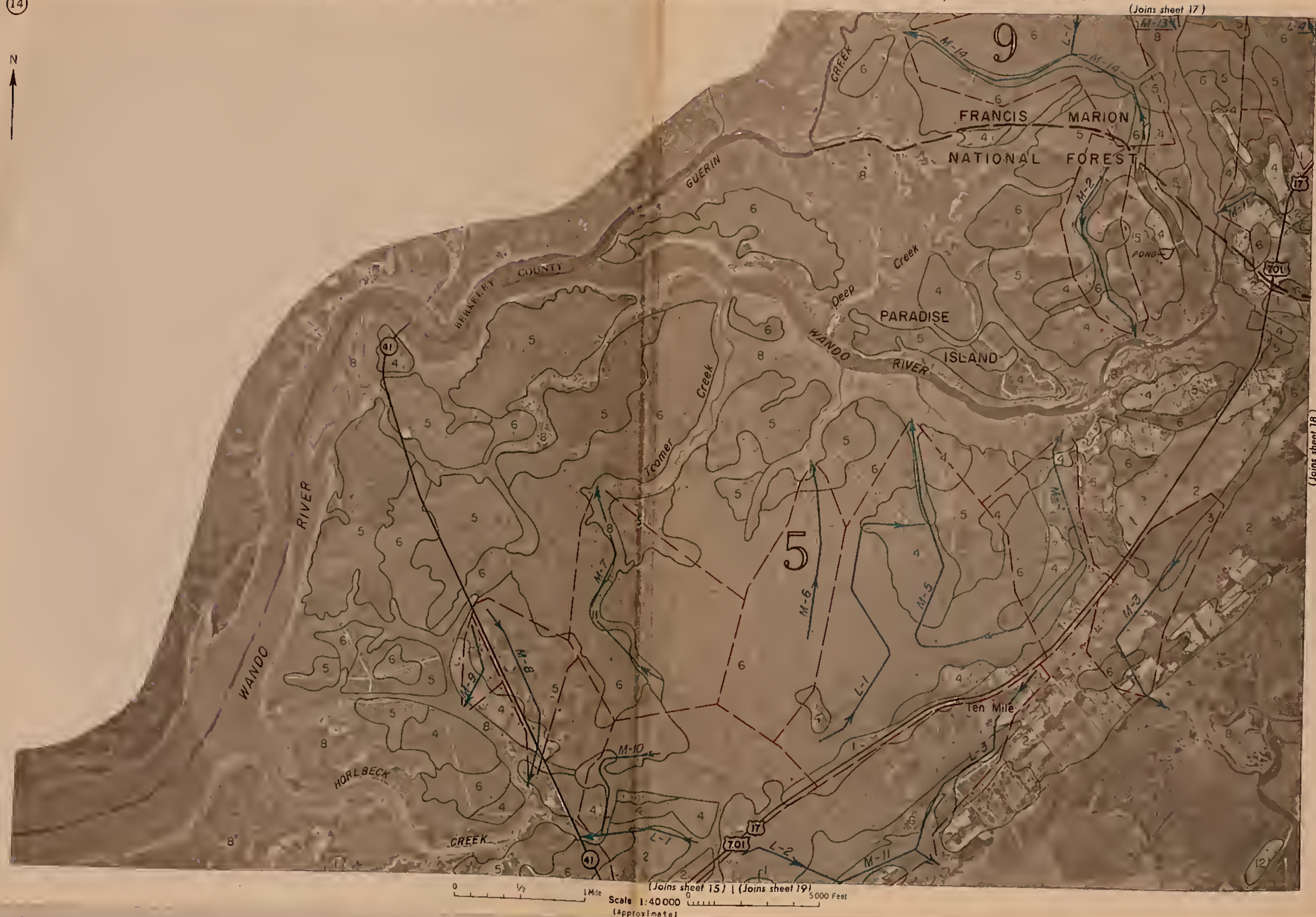
(Joins sheet 19)

0 ½ 1 Mile

Scale 1

(Approx

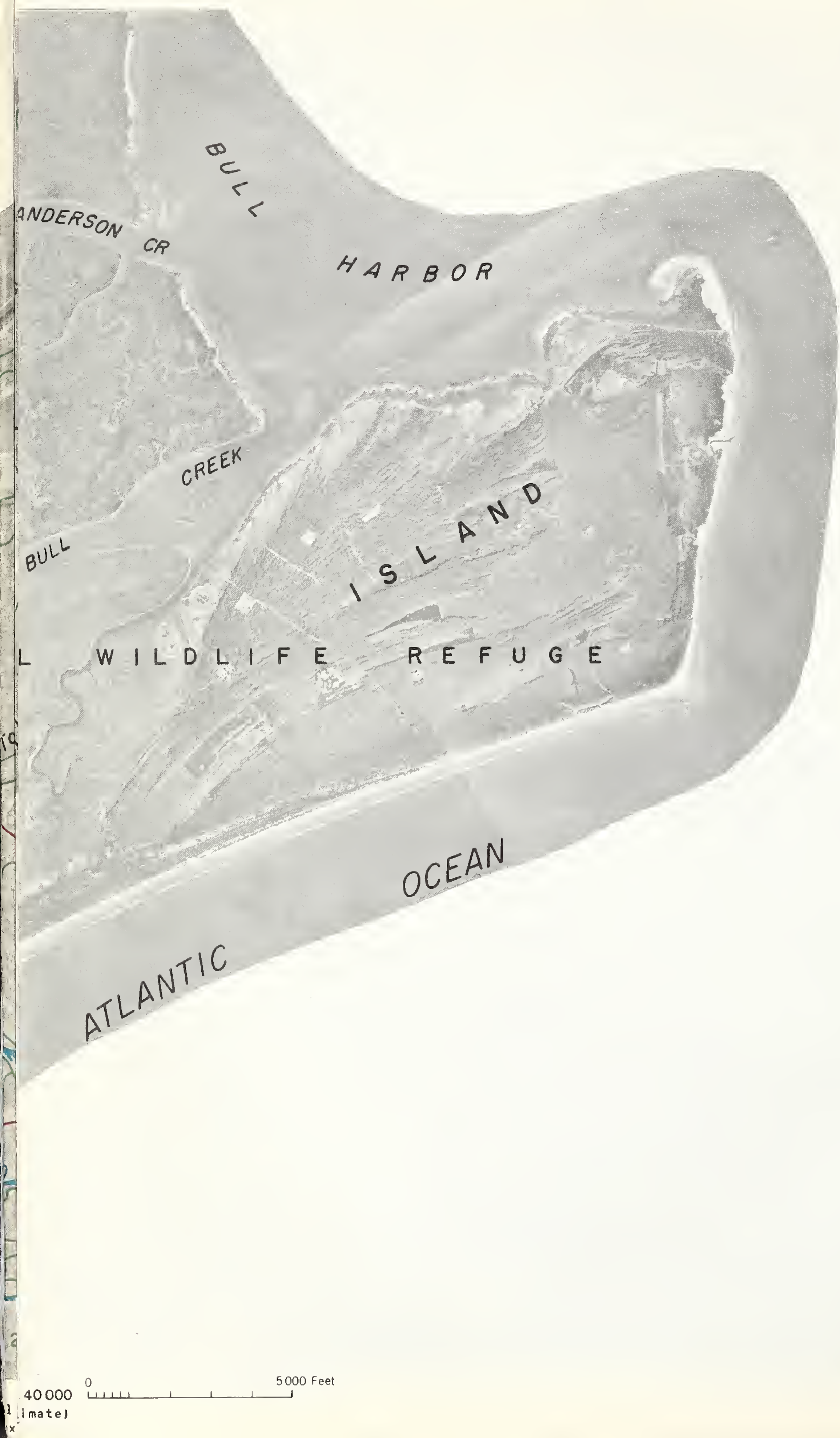
FEASIBILITY STUDY OF REQUIREMENTS FOR MAIN DRAINAGE CANALS IN CHARLESTON COUNTY, SOUTH CAROLINA



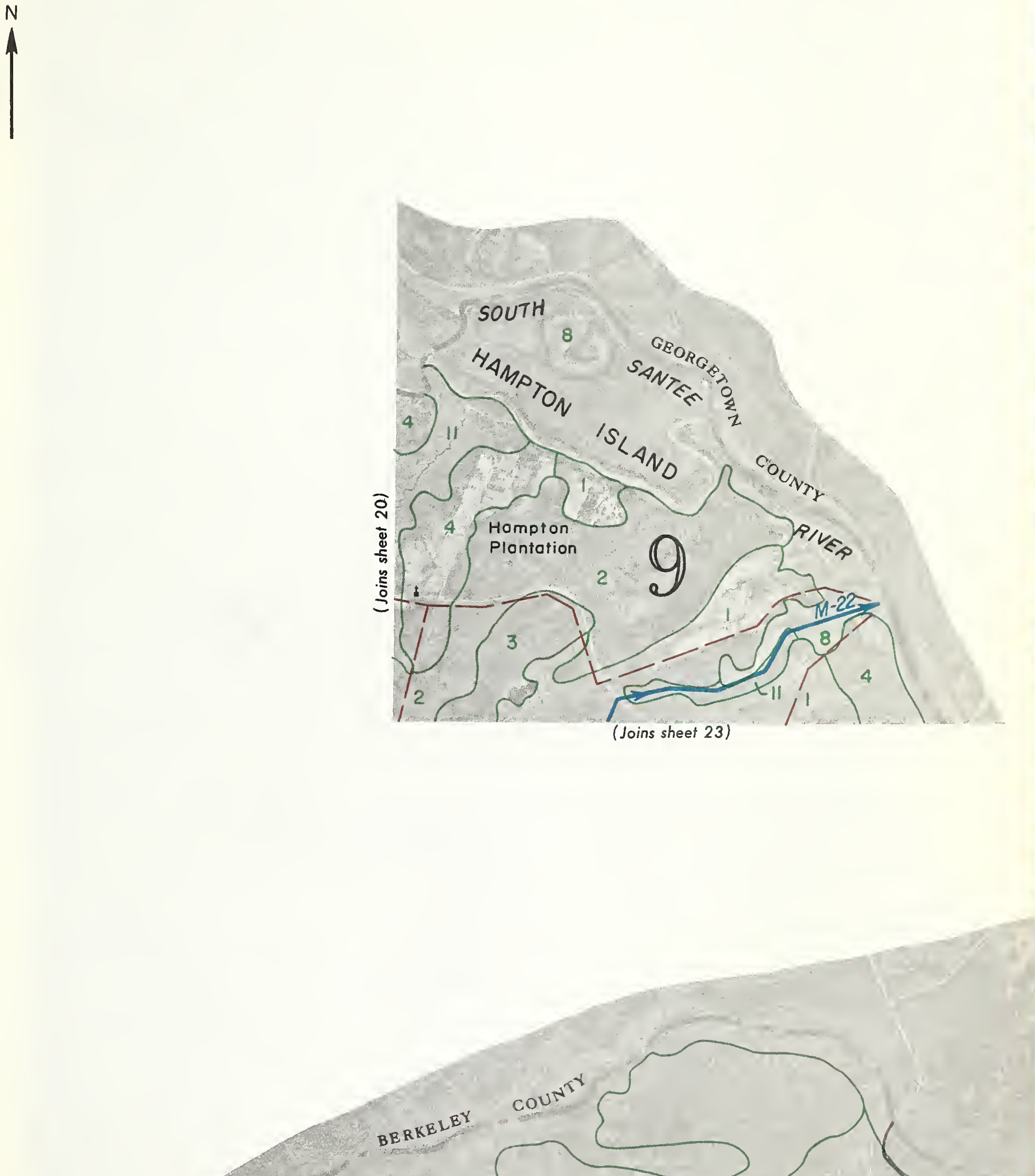
FEASIBILITY STUDY OF REQUIREMENTS FOR MAIN DRAINAGE CANALS IN CHARLESTON COUNTY, SOUTH CAROLINA

[illegible] Department of Agriculture, Columbia, South Carolina. This map was compiled as an uncontrolled mosaic from aerial photographs flown in 1961. Aerial photographs used by permission of the County Manager, Charleston County, South Carolina, and E. T. Wilkins Associates, Valuation Engineers, Charleston, South Carolina. Maps were prepared and surveys [illegible] in 1962.

Scale 1:40 000 (Approximate)
0 ½ 1 Mile
0 5000 Feet


BULL HARBOR
ANDERSON CR
BULL CREEK
BULL ISLAND
L WILDLIFE REFUGE
ATLANTIC OCEAN
40 000
0
5000 Feet
imate)

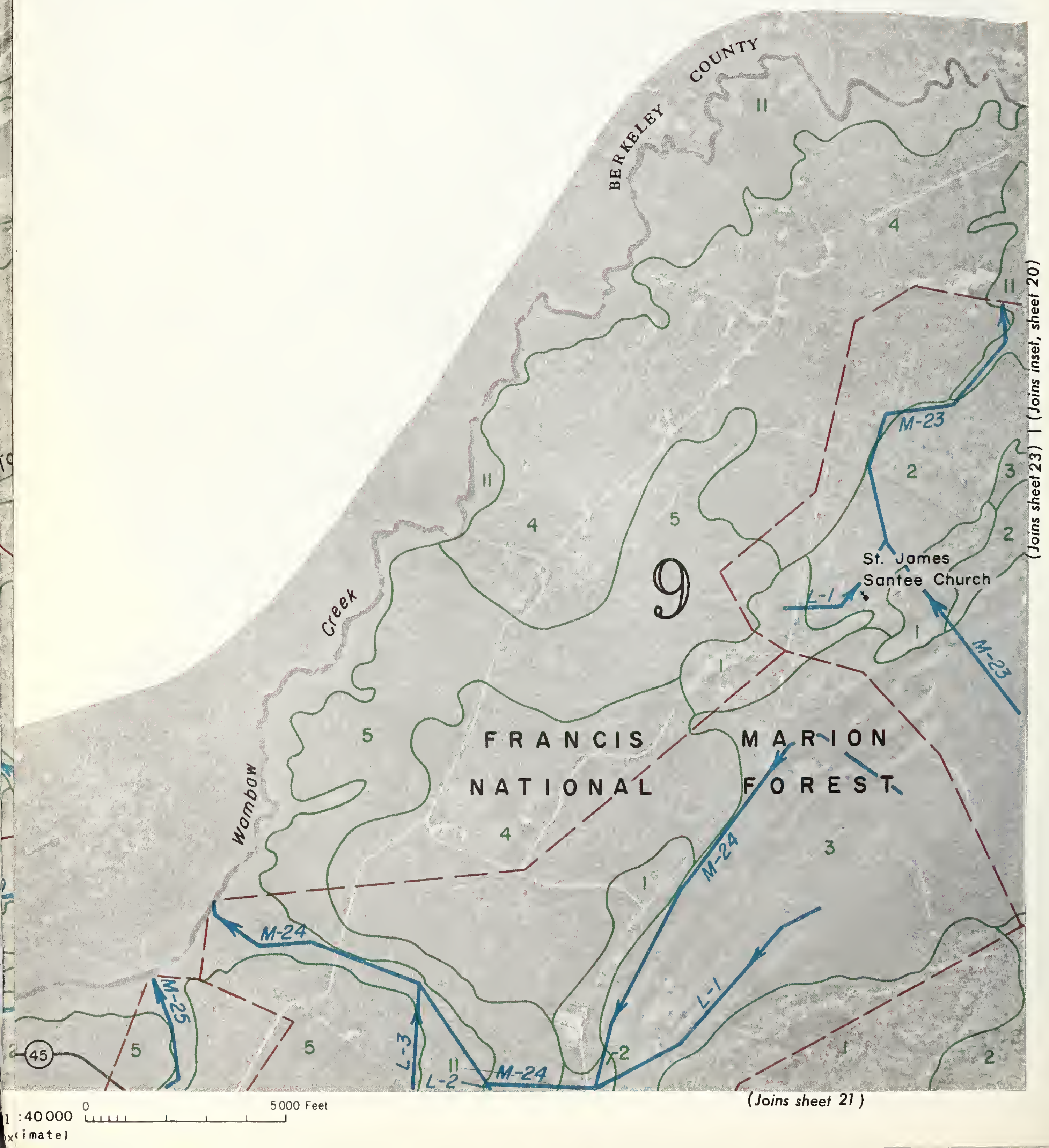
20


N
SOUTH
HAMPTON
ISLAND
SANTEE
GEORGETOWN
COUNTY
RIVER
Hampton
Plantation
9
M-22
(Joins sheet 20)
(Joins sheet 23)
BERKELEY
COUNTY
0
1/2
1 Mile
Scale 1
(Appro

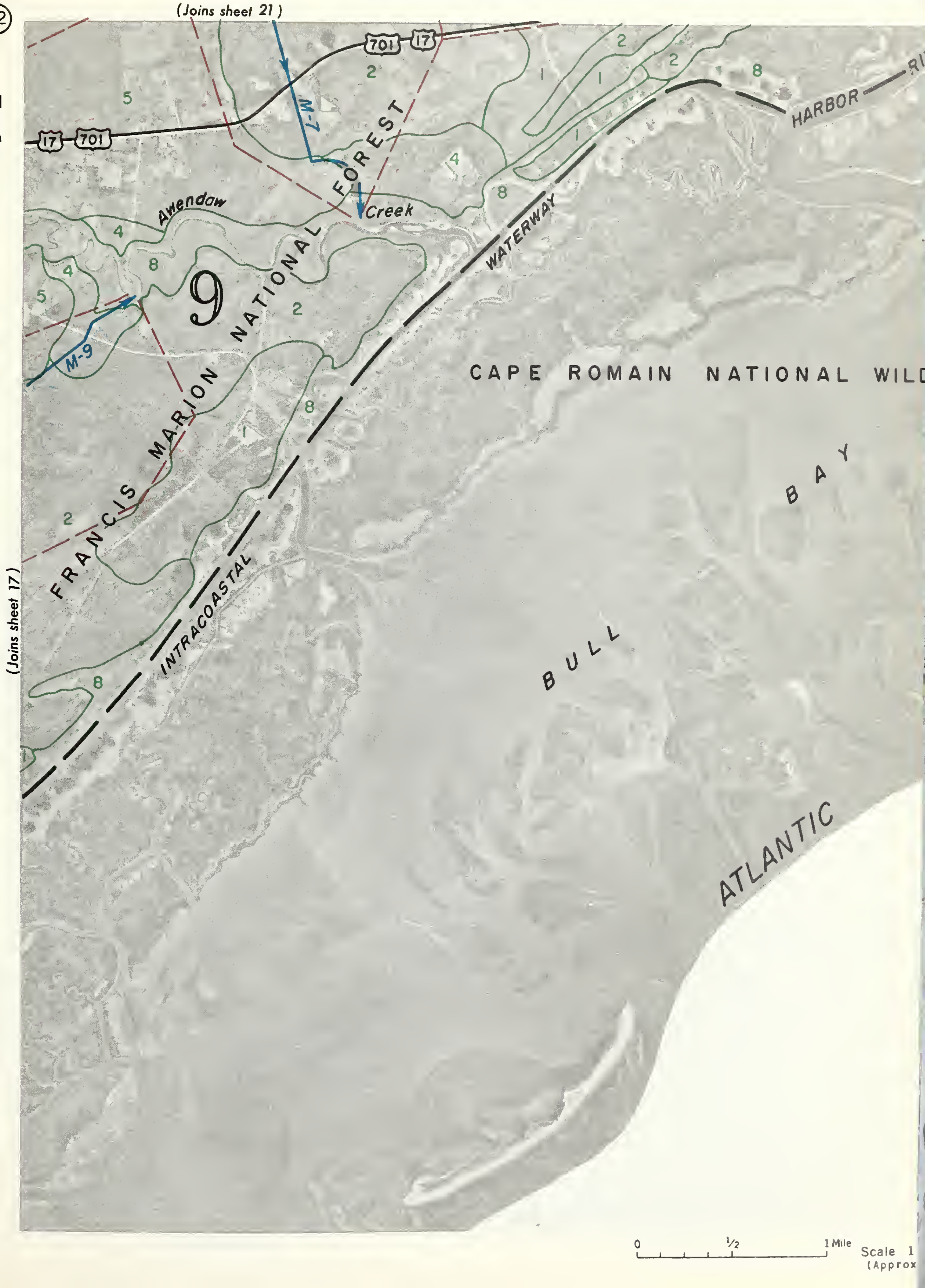
FEASIBILITY STUDY OF REQUIREMENTS FOR MAIN DRAINAGE CANALS IN CHARLESTON COUNTY, SOUTH CAROLINA

FEASIBILITY STUDY OF REQUIREMENTS FOR MAIN DRAINAGE CANALS IN CHARLESTON COUNTY, SOUTH CAROLINA

...the complete feasibility study report, write the Soil Conservation Service, U. S. Department of Agriculture, Columbia, South Carolina. This map was compiled as an uncontrolled mosaic from aerial photographs flown in 1961. Aerial photographs used by permission of the County Manager, Charleston County, South Carolina, and E. T. Wilkins Associates, Valuation Engineers, Charleston, South Carolina. Maps were prepared and surveys executed in 1962.


BERKELEY COUNTY
Wambaw Creek
9
FRANCIS MARION NATIONAL FOREST
St. James Santee Church
M-23
M-24
M-25
L-1
L-2
L-3
45
(Joins sheet 23)
(Joins inset, sheet 20)
(Joins sheet 21)
1 :40 000
0
5000 Feet

22


(Joins sheet 21)
(Joins sheet 17)
N
17
701
M-7
M-9
Awendaw
Creek
FRANCIS MARION NATIONAL FOREST
9
INTRACOASTAL
WATERWAY
HARBOR RI
CAPE ROMAIN NATIONAL WILD
BULL BAY
ATLANTIC
1
2
4
5
8
0
½
1 Mile
Scale 1
(Approx

FEASIBILITY STUDY OF REQUIREMENTS FOR MAIN DRAINAGE CANALS IN CHARLESTON COUNTY, SOUTH CAROLINA

(Joins sheet 17)

(Joins sheet 19)

0 ½ 1 Mile Scale 1:40000 (Approximate) 0 5000 Feet

FEASIBILITY STUDY OF REQUIREMENTS FOR MAIN DRAINAGE CANALS IN CHARLESTON COUNTY, SOUTH CAROLINA

(Joins sheet 14) | (Joins sheet 18)

19

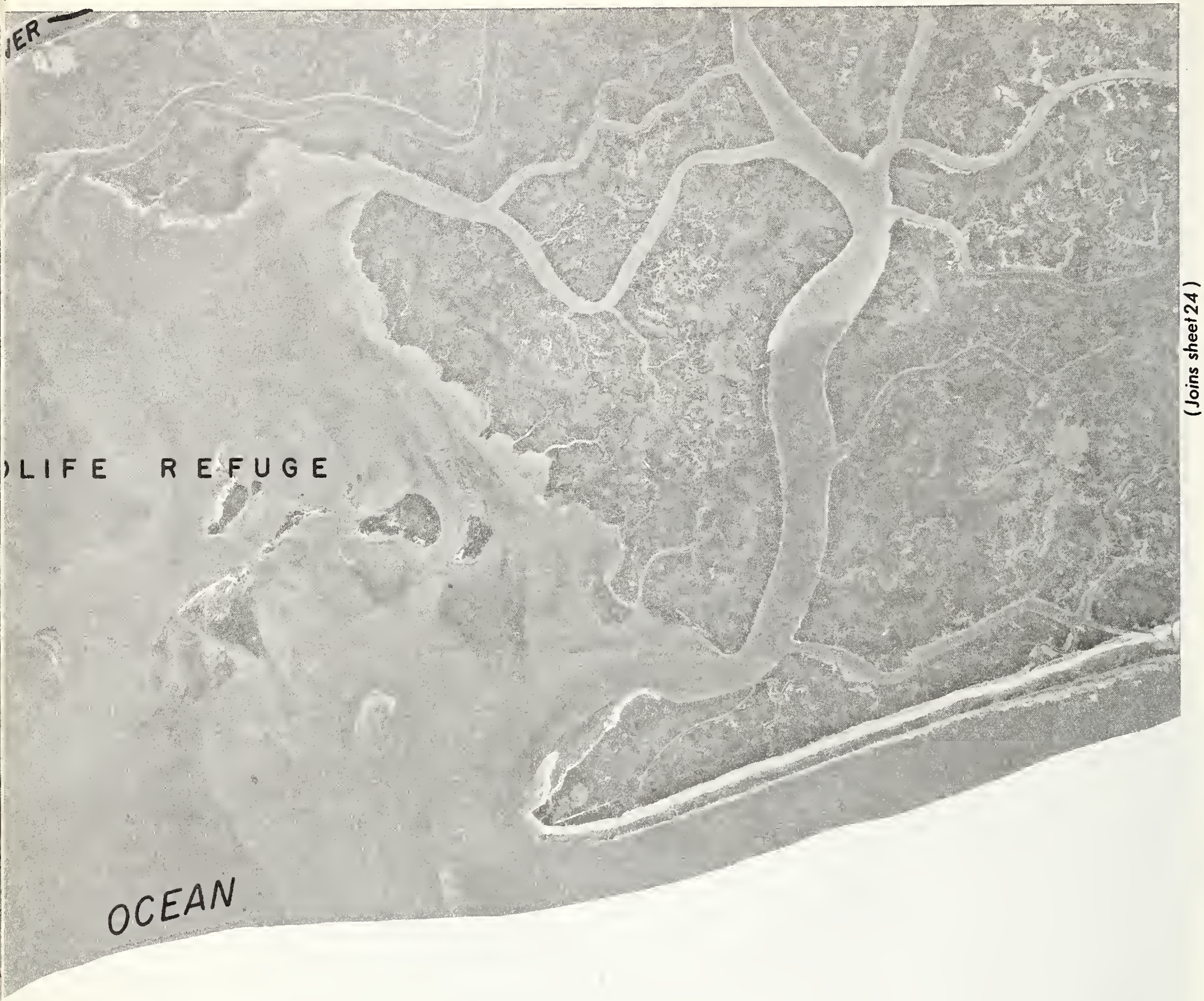
(Joins sheet 15)

(Joins sheet 21)

(Joins sheet 17)

Scale 1:40000 (Approximate) 0 ½ 1 Mile 0 5000 Feet

... and the Charleston Soil Conservation District. For information regarding the complete feasibility study report, write the Soil Conservation Service, U. S. Department of Agriculture, Columbia, South Carolina. This map was compiled on uncontrolled mosaic from aerial photographs flown in 1961. Aerial photographs used by permission of the County Manager, Charleston County, South Carolina, and C. T. Wilkins Associates, Valuation Engineers, Charleston, South Carolina. Maps were prepared and surveys executed in 1962.

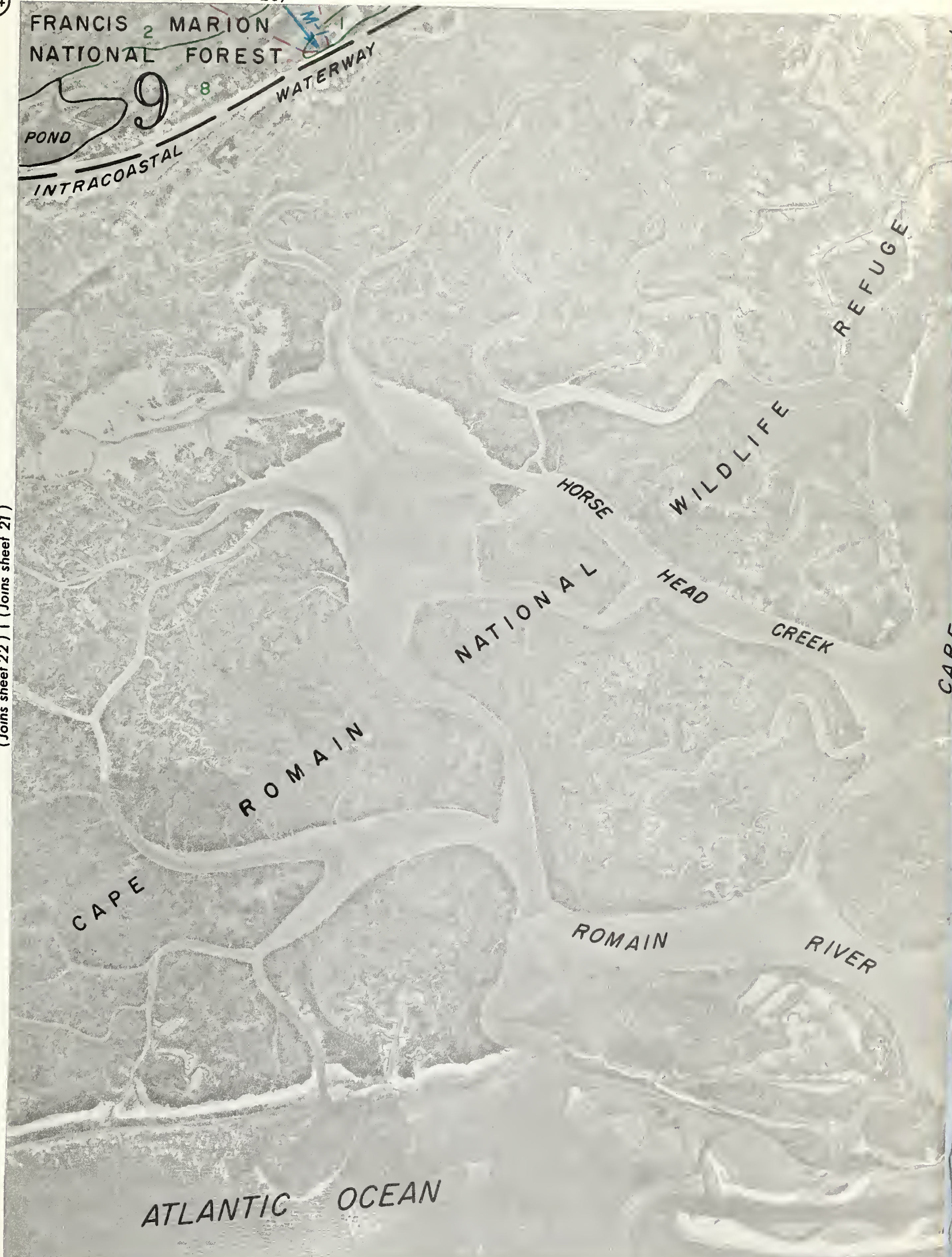


:40 000 0 5000 Feet
imate)

(24)

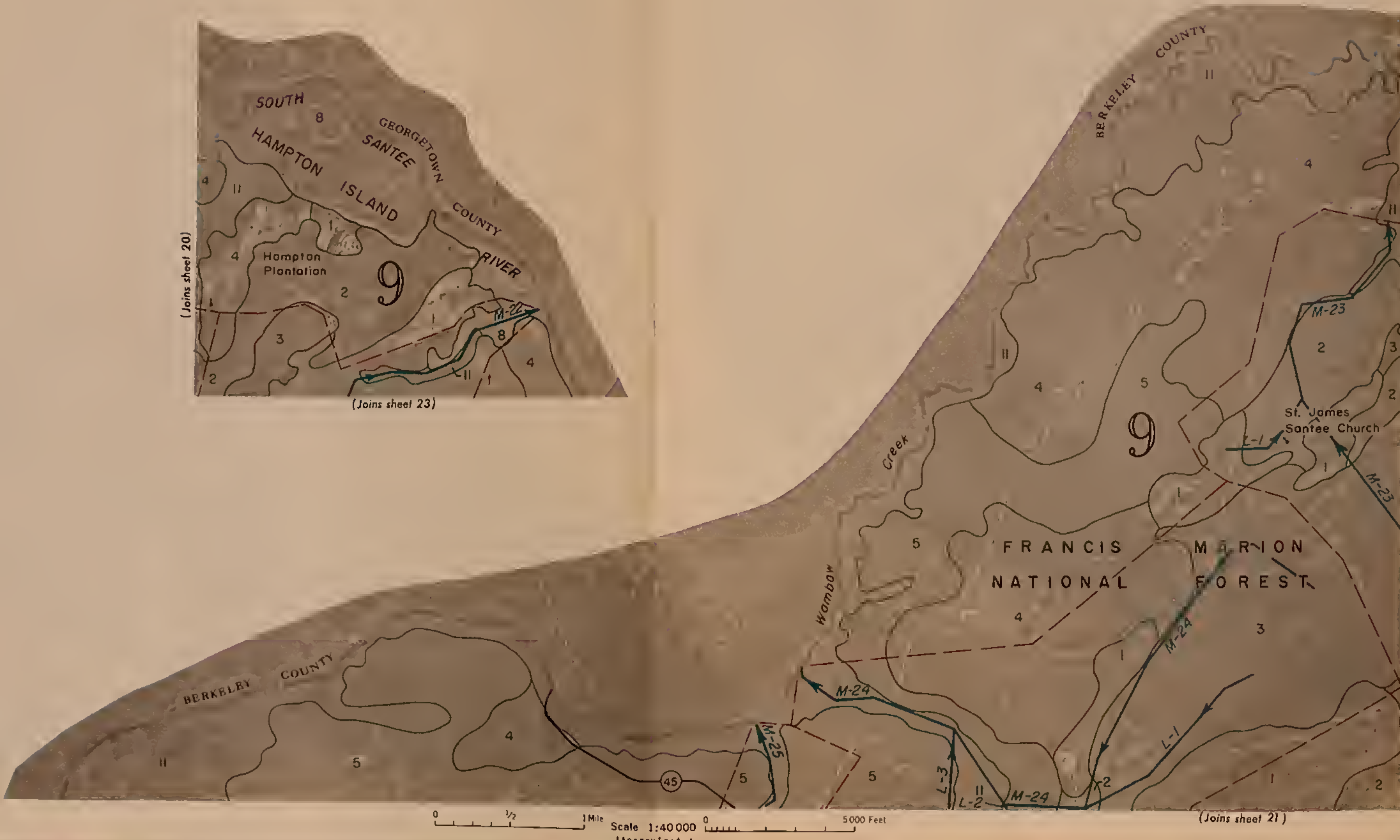
(Joins sheet 23)

(Joins sheet 22) | (Joins sheet 21)

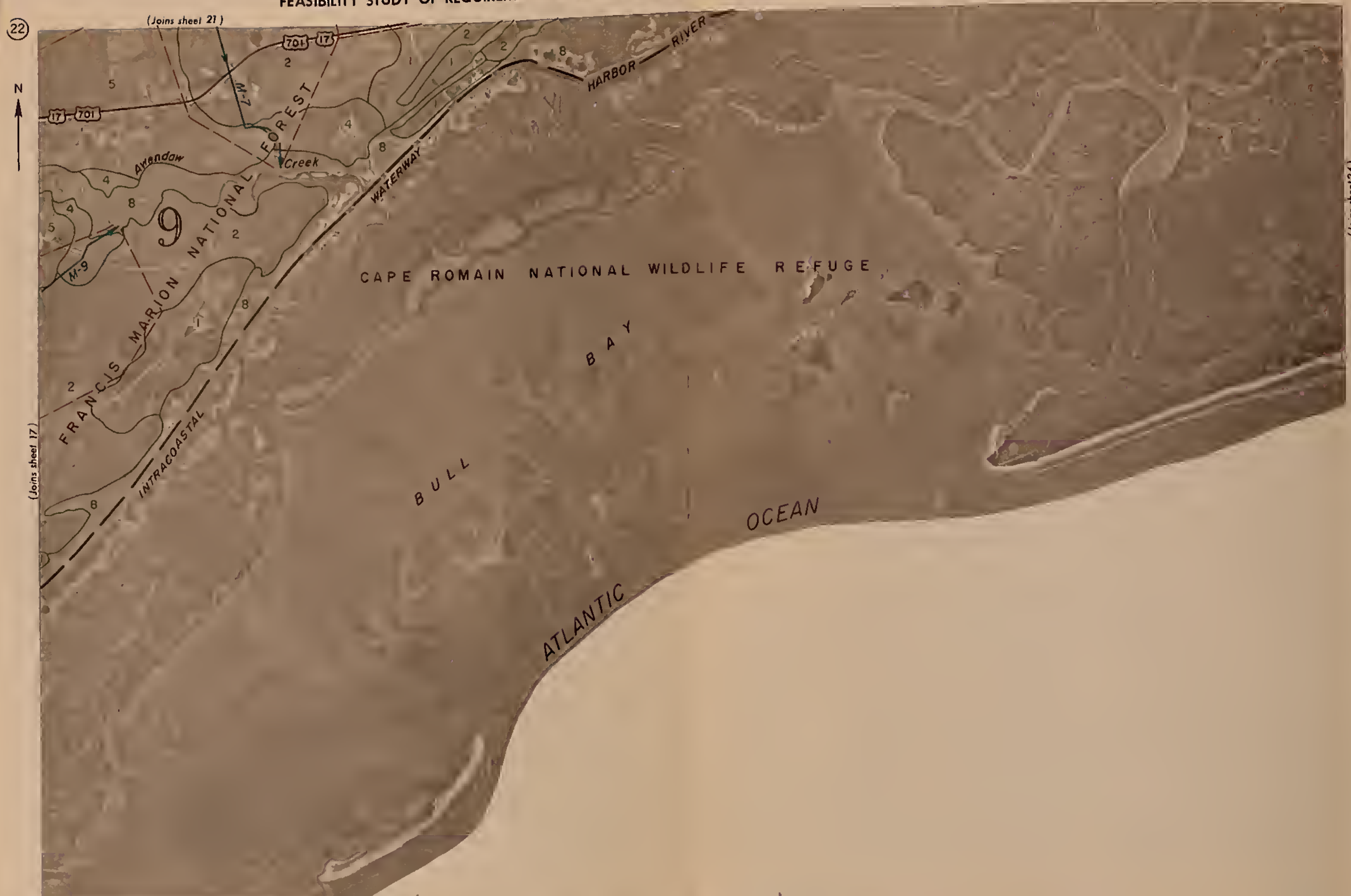


0 ½ 1 Mile

Scale 1
(Approx


SOUTH
HAMPTON ISLAND
SANTEE
GEORGETOWN
COUNTY
RIVER
Hampton Plantation
9
M-22
(Joins sheet 20)
(Joins sheet 23)
BERKELEY COUNTY
Creek
Wambaw
St. James Santee Church
FRANCIS MARION NATIONAL FOREST
M-23
M-24
M-25
L-1
L-2
L-3
45
(Joins inset, sheet 20)
(Joins sheet 23)
(Joins sheet 21)
Scale 1:40000 (Approximate)
0 1/2 1 Mile
0 5000 Feet

[illegible] the Charleston Soil Conservation District. For information regarding the complete feasibility study report, write the Soil Conservation Service, U. S. Department of Agriculture, Columbia, South Carolina. This map was compiled as an uncontrolled mosaic from aerial photographs flown in 1961. Aerial photographs used by permission of the County Manager, Charleston County, South Carolina, and C. T. Wilkins Associates, Valuation Engineers, Charleston, South Carolina. Maps were prepared and surveys executed in 1962.



0 ½ 1 Mile Scale 1:40000 0 5000 Feet
(Approximate)

FEASIBILITY STUDY OF REQUIREMENTS FOR MAIN DRAINAGE CANALS IN CHARLESTON COUNTY, SOUTH CAROLINA

age canals in Charleston County, South Carolina. The maps have been prepared in cooperation with and under the joint financial sponsorship of the Charleston County Council and the Charleston Soil Conservation District. For information regarding the complete feasibility study report, write the Soil Conservation Service, U. S. Department of Agriculture, Columbia, South Carolina. This map was compiled as an uncontrolled mosaic from aerial photographs flown in 1961. Aerial photographs used by permission of the County Manager, Charleston County, South Carolina, and E. T. Elkins Associates, Valuation Engineers, Charleston, South Carolina. Maps were prepared and surveys executed in 1962.

24
(Joins sheet 23)
(Joins sheet 22)
(Joins sheet 21)
N
FRANCIS MARION NATIONAL FOREST
POND
9
INTRACOASTAL WATERWAY
ALLIGATOR CREEK
CAPE ROMAIN NATIONAL WILDLIFE REFUGE
HORSE HEAD CREEK
CAPE ROMAIN HARBOR
ISLAND
ATLANTIC OCEAN
ROMAIN RIVER
CAPE
ATLANTIC OCEAN
(Joins sheet 23)
SOUTH SANTEE RIVER
GEORGETOWN COUNTY
Scale 1:40000 (Approximate)
0 ½ 1 Mile
0 5000 Feet